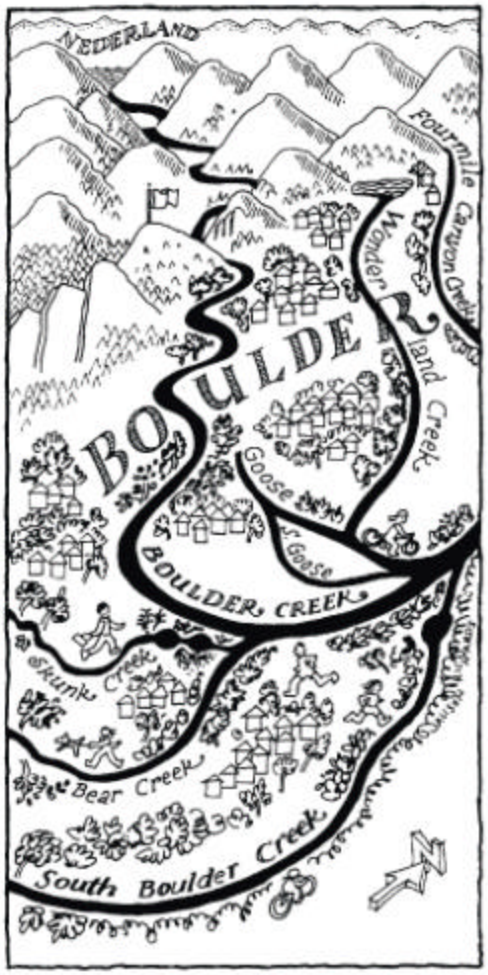
Greenways Master Plan



December 2001

City of Boulder

Greenways
Purpose Statement

The purpose of the Greenways Program is to extend the stewardship of the city of Boulder to the important riparian areas along the tributaries of Boulder Creek.

The Greenways Program will manage these areas so as to integrate the following objectives:

to protect and restore riparian, floodplain, & wetland habitat

to enhance water quality

to facilitate storm drainage & mitigate floods

to provide alternative transportation routes or trails for pedestrians & bicyclists

to provide recreation opportunities

to protect cultural resources

Acknowledgements

The Greenways Master Plan Update was developed by an interdepartmental group of city staff that represent the interests and objectives of the Greenways Program. A special thank you goes to Kris Kranzush, a private consultant who created and compiled this Master Plan document based on meeting notes, memoranda and input from city staff. During the three-year update process the following individuals participated in the Greenways Staff group that developed this Plan:

Don D'Amico	Open Space/Mountain Parks Department
Bob Harberg	Public Works Department
Doug Hawthorne	Parks & Recreation Department
Bev Johnson	Planning Department
Joe Mantione	Open Space/Mountain Parks Department
Jane Nelson	Public Works Department
Marni Ratzel	Public Works Department
Randall Rutsch	Public Works Department
Betty Solek	Public Works Department
Nancy Steinberger	Public Works Department
Alan Taylor	Public Works Department
Noreen Walsh	Public Works Department
Brent Wheeler	Open Space/Mountain Parks Department
Ned Williams	Public Works Department

Dick Brasher, Casey Crow, Dave Dougherty, Gary Lacy, and Debbie Ritter were instrumental in providing historical information and continuity for the Program.

Additional city staff and representatives from outside agencies also participated in discussions and resolution of organizational issues associated with the Greenways Program. These individuals include:

Dave Bennetts	Urban Drainage & Flood Control District
Ellie Bussi-Sottile	Parks & Recreation Department
John Campagnola	Public Works Department
Mark Getman	Public Works Department
Stephanie Grainger	Public Works Department
Alan Nelson	University of Colorado
Bob Peck	Parks & Recreation Department
Dave Plute	Boulder Valley School District
Scott Robson	Boulder County Transportation
Donna Scott	Public Works Department
Don Vetterling	Public Works Department
Dan Wolford	Boulder County Parks & Open Space

The overall support and guidance from Ron Secrist, Dave Rhodes, Christine Andersen, Peter Pollock, Maureen Rait, City Council and the five advisory boards (WRAB, TAB, PRAB, OSBT & Planning Board) is also greatly appreciated.

In addition, the work of Tanya Ariowitsch and Terry Stonich from Planning and Development Services has been invaluable. Tanya and Terry created the Greenways Master Plan Map and Maintenance Management Map contained in this document.

Recognition is also deserved for several members from the public that took a special interest in the Greenways Master Plan Update and the Greenways Program and were instrumental in the outcome of this project:

Linda Andes-Georges	Open Space Board of Trustees
Lisa Morzel	City Council
Alison Richards	Transportation Advisory Board
Joni Teter	Plan Boulder County

Finally I would like to acknowledge the first Greenways Advisory Committee for agreeing to participate as stewards of the Greenways:

Linda Jourgensen	Open Space Board of Trustees
Linda Andes-Georges	Open Space Board of Trustees (alternate)
Tina Nielsen	Planning Board
Macon Cowles	Planning Board (alternate)
Alison Richards	Transportation Advisory Board
Gil Barth	Water Resources Adviosry Board
Edward von Bleichert	Parks and Recreation Advisory Board
Janice Buswell-Lopitz	Environmental Advisory Board
Robin Madel	Committee Secretary

Thanks

Anne Noble
Greenways Coordinator

Amendments, Clarifications and Corrections
November 13, 2001

The following changes and additions shall be incorporated into the Greenways Master Plan document:

Amendments, Corrections & Clarifications

Chapter I

Executive Summary

- page 1, **Purpose of the Master Planning Process**

Add the following:
Master Plan Timeframe
To continue to be useful over time the Greenways Master Plan will need to be reviewed and updated as needed to reflect changing conditions and priorities. Therefore, this plan will be reviewed on an annual basis by the Greenways Advisory Committee and amended as needed.

- page 1, **Scope of Master Plan**

The Planning Board in their meeting on November 1, 2001 requested that the Greenways objectives be incorporated in areas along ditches as part of the city's on going negotiations with the ditch companies.

Chapter II

- page 9, correct spelling to "Olmsted"
- page 22, correct "currently"
- page 23, correct to read Eleven miles of Greenways path traverse city parks
- page 23, last paragraph

first sentence - change "full service" to "varying degrees of maintenance"
second sentence - continue sentence (after the word "program") with "specifically for Greenways and natural areas."
fourth sentence - change "monitoring" to "informal scans"

- page 37, correct "Greenway"
- page 41, 2nd paragraph

Change wording to:
The Urban Forestry Program provides planting, pruning, removal and routine safety inspections for city-owned trees on street rights-of-way and within city parks. The Forestry staff currently provides maintenance for over 40,000 trees within the city under their jurisdiction.

- page 41, 3rd paragraph

Trees located on city-owned lands within the Greenways corridors should receive routine inspections for the purposes of diagnosing problems, controlling disease, and reducing liability.

- page 47, last paragraph, second bullet

add the word "replacement" so that the bullet reads, "Responsibilities for installation, replacement, and maintenance of trees need to be clarified."

- page 48, correct to read 26th to Edgewood segment of Goose Creek

Chapter III

- page 74, **Transportation Goals**

Consider adding a policy statement that indicates a commitment to provide adequate bicycle parking along new multi-use path segments at appropriate activity generators such

as parks and open space trailheads. "The Bicycle System Plan, a component of the Transportation Master Plan update of 1996 outlines the importance of secure bicycle parking as a factor in determining bicycle mode share. In accordance with the city's criteria for bicycle parking, it is recommended that future greenways projects evaluate and install adequate and secure bicycle parking at destination areas, as appropriate."

- page 74, correct "compliments"

Chapter IV

The following **public involvement process** will be incorporated into all Greenways Program projects:

1. The first step in initiating a Greenways project will be to identify property ownership.
2. In locations where the Greenway is not within a city easement or right of way, the property owners will be contacted immediately to initiate easement negotiations and incorporate property owner interests into conceptual design alternatives. Property owners adjacent to the Greenway will also be contacted.
3. The Project Manager will develop various conceptual design alternatives, which will be presented to adjacent property owners. Property owner concerns and interests will be incorporated into the Community and Environmental Assessment Process (CEAP) alternatives.
4. The CEAP process described on page 17 and outlined in Appendix II-2 will follow.

Chapter VI

- page 96, correct "litter"
- page 97, correct spelling to "Eben Fine"
- page 98, section continued from previous page

Lighting

Amend last sentence to read: Street lights must be individually evaluated in terms of their perceived safety from crime and conflict with other users, and effects on habitat.

Other Improvements

Amend last sentence to read: These improvements will be evaluated on a case by case basis and discussed for incorporation in the Design Guidelines update.

- page 97, clarify drinking fountain cost

Drinking Fountain costs are shown on page 97 as $3000 and in Appendix VII-2 as $15,000. The $3000 cost is for the drinking fountain only, with the $15,000 including the cost of the drinking fountain, extension of the water line to the appropriate location, tapping the water line, a backflow preventer, a water meter and associated connection fees.

Chapter VII

- pages 99 and 100, 4th paragraph, change to read:

All of the Greenways goals & objectives, except the environmental objectives, are covered under individual master plans and associated city work plans. Consequently, a method was developed to prioritize environmental projects during the Greenways master planning process. A prioritized list of environmental projects and opportunities resulted which will facilitate identification of potential funding sources to accomplish these projects. The prioritization method involved tabulation of all identified Greenways environmental projects, application of a scoring system for projects and ranking of projects based on Greenways objectives and environmental assessments.

Scores for the projects were developed from recent environmental studies, a matrix of overlapping and conflicting objectives and the results of a weighting analysis of stresses on Greenways riparian habitat and water quality.

The stress analysis was based on a methodology developed by the Nature Conservancy entitled "The 5-S Framework for Site Conservation". The method involves:

- Identifying specific environmental functions of Greenways that are impaired system-wide
- Evaluating severity and extent of stresses on riparian and water quality functions
- Identifying mitigation strategies to alleviate these stresses

Identified mitigation strategies were assigned weighting factors in terms of feasibility, cost and effectiveness. Results of the stress analysis are summarized in Table VII-3.

The stress analysis was system-wide in that it was applied to Boulder Creek and its tributaries. The list of environmental projects and opportunities was reviewed to categorize the type of mitigation strategy, which would be accomplished by each project. Weights for each mitigation strategy were incorporated into the overall scoring system, which included habitat quality, overlap or conflict with other Greenways, objectives in the reach, property ownership and risk of failure. Results of the project ranking based on these scores are provided in Table VII-4.

- page 104, Fourmile Canyon Creek Reach 3

Clarify the plan for a path between Garnet Lane and 19th Street. Currently two bullets state contradictory plans. (Bullet 4 states "Construct soft-surface pedestrian only path between Garnet Lane and 19th Street, yet Bullet 5 states: "Re-evaluate multi-use path from 19th to Garnet Lane and between Garnet Lane and 26th Street. "

Transportation's preferred position is to maintain continuity of the trail and therefore supports including a proposed continuous multi-use path between Garnet Lane and 26th Street.

The North Boulder Subcommunity Plan shows an off street pedestrian only path between Garnet Lane and 19th Street, with an on street connection between Garnet Lane and 26th Street. Construction of a multi-use path would require an amendment to the North Boulder Subcommunity Plan. The Greenways Master Plan is recommending that a multi-use path be reconsidered in the future, with an Amendment to the North Boulder Subcommunity Plan. This recommendation was made in light of major flood improvements that are being proposed along Fourmile Canyon Creek, which will require considerable habitat restoration.

- page 107, Fourmile Canyon Creek Reach 5

Location:

Change wording to read "Construct trail from west side of Boulder Valley Meadows Park to Broadway"

- page 108, Wonderland Creek Reach 1

Delete bullet 2 - it is done.

- page 111, Wonderland Creek Reach 4

Other Conditions, Bullet 1 inaccurately states "No trail exists".

- page 113, Wonderland Creek Reach 6

trail from Poplar to Garnet done

- page 118, Goose Creek Reach 3

Improve connections to businesses north and south of Goose Creek

- page 120, Goose Creek Reach 4

Add bullet: "Construct trail connection to 29th @ Bluff Street
Amend bullet 1 under "Other conditions" to read: "Trail Exists"

- page 122, Goose Creek Reach 6

Add bullet: Look at possibility of constructing a trail connection between 13th - 19th Streets in conjunction with potential daylighting of creek.

- page 123, Elmer's Twomile Creek

move Valmont after Glenwood (sequence of underpasses)

- page 124, Boulder Creek

As part of the Greenways Design Guidelines update, consider including a policy statement regarding maintaining and expanding a continuous soft path trail along the entire Boulder Creek corridor.

- page 124, Boulder Creek Reach 1

change trail exists to trail exists from Valmont to Goose Creek

- page 148, South Boulder Creek Reach 2

correct spelling to Leggett

- page 150, South Boulder Creek Reach 3

change to "on road connections"

The Transportation Advisory Board requested that the reach inventory note the reaches where no trails are currently being proposed because of residential development conflicts.

The following reaches do not currently show a proposed continuous trail connection because of potential residential conflicts:
Fourmile Canyon Creek Reach 3 (per the North Boulder Subcommunity Plan)
Wonderland Creek Reaches 5, 6 and 7 (per the North Boulder Subcommunity Plan)
Goose Creek Reach 6
Skunk Creek Reach 3
South Boulder Creek Reach 3

Chapter VIII

- page 157, correct "tracking"
- page 159, Section D

Change title from "Forestry Maintenance" to "Tree Maintenance"
first paragraph of section D, fifth sentence - delete the words "and safety" so that it reads "...Parks staff performs clearance pruning." In the next sentence, change the word, "Division" to "Section"

- page 162, Table VIII-2

In the 2nd row (the Forestry row) below the Trees heading, delete the words, "Accelerated trim (by "green" time)" - note - leave those words in the cell above
in the footnote bullet that explains Accelerated trim - change the word "bloom" to "leaf out"

- Appendix III-1-3 correct "sculpture garden"

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Greenways Master Plan

I. Executive Summary

A. Introduction

The Greenways Program was originally envisioned as a multi-objective program. While all of the objectives of the Greenways Program can be addressed in separate programs, the Greenways Master Plan integrates these together as a special resource to allow coordinated action involving multiple departments. This Master Plan update provides an opportunity to evaluate the city's efforts to balance goals and objectives within the Greenways Program and to allow mid-course correction of the Program. It is also an opportunity to provide clarity about the purpose of the Program, to define how the Program is going to be carried out, to fully express the original intent of the Program and to create a plan that will provide the vision and integration to protect and manage the creeks and riparian areas into the future.

B. Purpose of Master Planning Process

The Boulder Valley Comprehensive Plan and subcommunity plans provide the overall policy direction for the master plans. The city's master plans are developed consistent with the policies, plans and population and employment projections provided by the Comprehensive Plan. Master plans provide a long-range policy and implementation framework for service provision and capital improvement programming. Master plans provide planning for the delivery and funding of specific services, facilities, programs, and identify costs associated with current deficiencies and replacement needs, and those associated with growth.

The master plans establish the policies, priorities, service standards, and facility and system needs. The facility and service priorities and funding plan established through the master planning process provide the basis for capital improvement programming and annual budgeting. They also provide a conceptual framework to make decisions on delivering and coordinating services in the most efficient and effective way, providing a long term perspective within which day to day service delivery and resource allocation decisions can be made.

C. Scope of Master Plan

The city of Boulder Greenways system is comprised of a series of corridors along riparian areas including Boulder Creek and six of its tributaries, which provide an opportunity to integrate multiple objectives, including habitat protection, water quality enhancement, storm drainage and floodplain management, trails, recreation and cultural resources. A purpose statement was developed for the Program and is as follows:

> The city of Boulder Greenways system is comprised of Boulder Creek and six of its tributaries:
> - South Boulder Creek
> - Bear Canyon Creek

- Skunk Creek
- Goose Creek
- Wonderland Creek
- Fourmile Canyon Creek

The Greenways Program seeks to coordinate and integrate as appropriate the following management objectives:

- Riparian, floodplain & wetland protection and restoration (Habitat)
- Water quality enhancement
- Storm drainage (Flood Mitigation)
- Alternative transportation routes for pedestrians and bicyclists (Trails)
- Recreation
- Protection of cultural resources

There are 13 main tributaries to Boulder Creek and several smaller drainages within the city limits of Boulder. During the Master Plan update process, discussions of expanding the Greenways Program to include all of the tributaries, as well as irrigation ditches, within the city of Boulder took place. An expanded Greenways Program provides a greater opportunity to comprehensively manage the riparian corridors to meet all of the stated objectives. While concerns were raised of limited resources to expand the Program, the interdepartmental staff group involved in the update process felt that a comprehensive approach is necessary so that Greenways values could be applied on a city-wide basis. Staff recommends an incremental approach to the expansion of the Program, with this Master Plan update focusing on the six designated tributaries and Boulder Creek and a subsequent update utilizing the criteria developed in this update to evaluate the remaining tributaries and irrigation ditches within the city. Future recommendations for expansion of the Greenways Program will be developed and presented to the Greenways Advisory Committee, comprised of one representative of the Planning Board, Open Space Board of Trustees, Water Resources Advisory Board, Parks and Recreation Advisory Board and Transportation Advisory Board. The Greenways Advisory Committee will provide recommendation to staff and City Council concerning proposed program changes.

D. Issues

A number of issues and tasks associated with the implementation of the Greenways Program and the maintenance of the system have been identified and addressed as part of the Master Plan update. These include:

Environmental

- Perform a system wide environmental analysis (Chapter III, "Plan Development")
  As a part of the Master Plan update process, terrestrial and aquatic habitat have been evaluated for all stream reaches, and a cultural resource inventory of the Greenways has been completed. The Reach Inventory, Projects and Opportunities (Table VII-1) presented in Chapter VII includes the results of these analyses.

- Develop a list of environmental enhancement projects (Chapters VII, "Future Opportunities")
  All of the Greenways goals and objectives except the environmental objectives are addressed in individual master plans and associated city work plans. A prioritized list of environmental projects and opportunities has been developed to facilitate identification of potential funding sources for these projects.
- Establish a process to prioritize competing goals (Chapter III, "Plan Development")
  Each stream reach has been ranked by objective for the purpose of balancing conflicting interests and identifying opportunities to address multiple objectives at the time a project is taken forward. Conflicts have been identified on seven creek segments (Table III-3).
- Balance the environmental goals with other competing goals. (Chapter VII, "Future Opportunities")
  Conflicts (Table III-3) arise in areas where the aquatic and riparian habitat were either classified as high and flood maintenance activities, flood improvements or a path has been proposed. Proposed projects may also conflict with Open Space management philosophies. Specific recommendations on how to address these conflicts through the evaluation of design alternatives have been identified in the Reach Inventory, Projects & Opportunities (Table VII-1).
- Look at wetlands mitigation banking (Chapter VI, "Future Programs")
  There are many potential benefits associated with the development of a city wetlands bank, including ensuring no net loss of wetlands and streamlining permitting process for future projects. The city should continue to explore the development of a wetlands bank.
- Coordinate wetlands protection or mitigation early in the design phase of a project as a part of the Community and Environmental Assessment Process (CEAP). (Chapter III, "Plan Development")
  The emphasis of the CEAP analysis is a general scoping of impacts and associated impact avoidance/mitigation strategies in order to allow a comparative impact assessment of selected major alternatives. CEAPs for future projects within the Greenways should include identification and consideration of the wetlands protection and mitigation opportunities that have been identified for each creek segment in the reach inventory.

Funding (addressed in Chapter IX, "Organizational Structure and Finance"

- Evaluate funding mechanism and priority for environmental improvements (Chapter VII, "Future Opportunities")
  All Greenways Program goals and objectives except the environmental objectives are covered under individual master plans and associated city work plans. Stand-alone environmental projects were identified for each stream reach, and the projects were prioritized. The top 10 environmental projects identified using the ranking method were

further considered in terms of potential opportunistic funding sources in the development of the 2002 - 2007 Capital Improvement Program (CIP).

- Establish appropriate funding for maintenance (Chapter VIII, "Maintenance Plan")
  The Greenways system is currently maintained by several maintenance work groups within the city, which are responsible for different locations and tasks (see Chapter II). Additional maintenance needs were identified during the Master Plan update. Additional funding required to pursue all of the maintenance activities identified during the Master Plan update would be difficult to secure. The recommendation for the 2002-2007 CIP is to divert one third of the Greenways budget from capital projects into a weed control and habitat maintenance effort. This would be split evenly between the current funding sources for the Greenways.
- Providing the level of funding adequate for all program purposes (Chapter IX, Organizational Structure and Funding)
  Excluding proposed improvements which would be considered under the CIPs for other departments such as Transportation and Flood Control, potential Greenways projects identified in this Master Plan update have an associated total construction cost of almost $16 million (without design, property acquisition or studies costs). At the current annual funding of $450,000 per year, with $150,000 being dedicated to habitat maintenance, proposed improvements could be completed over a 53-year period, assuming all these improvements are funded solely through the Greenways budget.

Organizational Structure (addressed in Chapter IX, " Organizational Structure and Finance")

- Define Program purpose (Chapter II, "Background Information")
  The Greenways Program purpose statement appears in Section I.C, above.
- Decide on organizational structure for the Greenways Program (Chapter IX, "Organizational Structure and Finance")
  The Greenways Coordinator will be part of the Utilities organizational structure, reporting to the Utilities Project Coordinator. The Greenways Coordinator will work with an interdepartmental staff review group (the Greenways Coordination Team) representing the various objectives of the Program. The Greenways Coordination Team will be responsible for coordinating information about the Program with their board members and other city staff from their departments. A new advisory committee, the Greenways Advisory Committee (GAC) will be formed. The CIP and CEAP for Greenways projects will be reviewed by the GAC in a public hearing.

Maintenance (addressed in Chapter VIII, "Maintenance Plan")

- Develop a comprehensive maintenance plan
  The maintenance plan is contained in Chapter VIII.
- establish maintenance standards (signs, reclamation, weed control etc.)
  Maintenance standards for snow removal, path system inspection and trash collection have been established (Table VIII-2).
- Identify (clearly defined) maintenance responsibilities

Maintenance responsibilities for each work group performing maintenance of the Greenways is shown in Table VIII-1. Maintenance responsibilities by geographic location have been mapped (Appendix VIII-1).

- Establish appropriate funding level for maintenance.
  As a part of the Master Plan update, the Greenways Coordination Team reviewed the current maintenance practices within the Greenways system to develop standards and to provide clarification for routine maintenance and periodic improvements of the Greenways system. Specific implementation guidelines and restoration techniques will be developed as a separate document in conjunction with an update of the Greenways Design guidelines.

Process (addressed in Chapter IV, "Planning, Permitting and Public Involvement Procedures")

- Developing a public review process that integrates all interests for each project (Chapter IV, "Planning, Permitting and Public Involvement Processes")
  The update of this master plan has resulted in the creation of a new advisory committee, the Greenways Advisory Committee (GAC) which will review the CIP and all Greenways project CEAPs in a public hearing. Specific procedures for coordinating the public review process for projects which may be undertaken outside the Greenways Program have also been developed.
- Clarify permitting and approval process requirements (addressed in Chapter IV, "Planning, Permitting and Public Involvement Procedures")
  The usual and customary permitting requirements and processes for Greenways projects have been included in Chapter IV. Other processes which may apply to some projects, depending upon land ownership and project location, have been listed.
- Develop a mutual acceptance of responsibility between work groups. Develop a way to coordinate and flag problems to deal with them (Chapter VIII, Maintenance Plan)
  The Greenways Coordination Team has clarified maintenance responsibilities among the work groups. It was decided that all Greenways maintenance problems can be reported to the Street and Bikeway Maintenance hotline at 303-413-7177. Maintenance responsibilities by geographic location have also been shown on a map contained in Appendix VIII-1.
- Identify property acquisition
  Property will be acquired in accordance with the Greenways Master Plan map and flood acquisition list.
- Identify future projects and programs (Chapter VI, "Future Programs" and Chapter VII, "Future Opportunities").
  The Greenways Coordination Team identified several opportunities to add or expand the current Greenways Program, including education and community opportunities, volunteer maintenance and project opportunities, and a variety of additional services which could be provided in the future. The Greenways Coordination Team also identified projects and opportunities for each of the Greenways objectives along

Boulder Creek and the designated tributaries. These projects and opportunities have been added to the Greenways Master Plan Map.

Design Guidelines (addressed in a separate document entitled *Boulder's Greenways Design Guidelines*, to be revised through a separate process)

- Evaluate alternatives to concrete trail, where appropriate
- Evaluate safety concerns
- Evaluate maintenance needs during project design
- Develop consistent nomenclature (greenways, bike path, flood channel)
- Establish when Greenways guidelines apply.

E. Projects & Opportunities, Funding, Organizational Structure and Maintenance

The Greenways Capital Improvements Program budget is currently funded at $450,000 per year, with equal contributions made from the Transportation Fund, Flood Control Fund and the Lottery Fund. The activities of the Program are coordinated by the Greenways Coordinator who currently works under the direction of the Utilities Project Coordinator in the Public Works Department. The Greenways Program was administered through the Public Works Transportation Division from 1989-1998.

The responsibilities of the Greenways Coordinator include coordinating the planning of projects that involve the interests of many city departments and divisions (Transportation, Utilities, Parks and Recreation and Open Space) and include the construction of trails and transportation improvements, flood improvements, and stream and riparian habitat improvements within the Boulder Creek corridor and the six designated tributaries to ensure compliance with the Greenways Master Plan. The Greenways Coordinator develops and oversees the Capital Improvement Program (CIP) and yearly Greenways budget in coordination with the other city departments and divisions performing work within these riparian corridors. The Greenways Coordinator, in cooperation with departmental Project Managers, is responsible for taking projects through the public process and insuring compliance with regulatory requirements. The Greenways Coordinator also coordinates the activities of the Greenways Program with outside agencies, such as the University of Colorado, Boulder Valley School District, the Urban Drainage and Flood Control District (UDFCD), Boulder County and private developers.

Maintenance of the Greenways is performed by a variety of departments and divisions within the city, as well as the UDFCD and private entities.

Table IX-1 presents an overview of proposed improvements within the Greenways system. These improvements are shown on the attached map (Appendix I-1 and described in the Greenways Master Plan Update Reach Inventory, Projects & Opportunities (Table VII-1). Total costs for all identified Greenways projects is almost $63 million. Greenways project funding relies not only on the Greenways Program budget, but on the capital improvement budgets of other city departments, as well as opportunistic funding through outside agencies, such as the Urban Drainage and Flood Control District

and private development efforts.

If it is assumed that capital improvement projects such as underpasses, drinking fountains, and flood control measures are funded by other city departments and outside sources (at a total construction cost of approximately $47 million, not including design, property acquisition, flood studies, etc.), Greenways trails and environmental restoration and protection opportunities account for just under $16 million of the total estimated construction cost (without accounting for design, property acquisition and studies costs). Assuming all of these improvements are taken on solely by the Greenways Program, at the current annual Greenways Program funding of $450,000 with $150,000 being dedicated to habitat and maintenance, completion of these projects would require more than 53 years.

F. Summary of other Master Plan Sections

The Master Plan presents the following information:

- Chapter II, Background Information, provides an overview of the history of the Greenways Program and its development and evolution to its current configuration.
- Chapter III, Plan Development, explains the processes used to complete this Master Plan, including the methods used to identify and prioritize project opportunities.
- Chapter IV, Planning, Permitting and Public Involvement Process, explains the methods for project planning, evaluation and review.
- Chapter V, Service Provision Policies, presents information pertinent to the Greenways Program from comprehensive plans and other city master and subcommunity plans.
- Chapter VI, Future Programs, identifies possible future opportunities to address Greenways Program objectives .
- Chapter VII, Future Opportunities, identifies Greenways projects and opportunities for each of the Greenways stream reaches.
- Chapter VIII, Maintenance Plan, defines consistent maintenance standards and identifies responsibilities for maintenance of Greenways projects.
- Chapter IX, Organizational Structure and Finance, presents a discussion of the organizational structure of the Greenways Program and a long term funding plan for the program.
- Chapter X, Appendices, contains supporting information used in the completion of this Master Plan.

II. Background Information

A. Introduction

The Greenways Master Plan builds on policies outlined in several existing adopted plans including the Boulder Valley Comprehensive Plan, the Comprehensive Drainage Utility Master Plan, the Transportation Master Plan, the Parks and Recreation Master Plan, the Open Space Charter, and the North Boulder Subcommunity Plan. Greenways projects are designed and constructed in compliance with the city's floodplain regulations and wetlands protection regulations, and Clean Water Act Section 404 permits. Projects for which Urban Drainage and Flood Control District (UDFCD) funds are sought are designed and built to meet or exceed UDFCD standards while ensuring that the city's environmental standards will be followed. The Greenways Program is administered by the Greenways Coordinator in the Public Works Department, who works in conjunction with the Planning, Open Space and Mountain Parks and Parks and Recreation Departments and other work groups within Public Works (Water Quality and Transportation).

B. History

In 1910, Frederick Law Olmstead, Jr. warned the Boulder Civic Improvement Association of the dangers of encroaching upon the floodplain of Boulder Creek (Olmstead 1910). His report described the possible scenario of filling the land near the creek with private uses,

> "...thus restricting the flood channel of the stream and sooner or later causing calamitous floods. This is on its face a plain, straightforward question of hydraulics and municipal common sense. If the people of Boulder only have the sense to take warning by the experience of other towns they will deal with it now, while it can be dealt with cheaply and easily, instead of waiting til a catastrophe forces them to remedy their neglect under conditions that will make a solution far more costly and less satisfactory."

Olmstead recommended against the construction of a deep, artificial flood channel. Instead he suggested that Boulder Creek be allowed to remain in a small shallow channel for the ordinary stages of the stream, with occupation of a much broader floodplain during larger storms. Recognizing the need to dedicate the land to a useful purpose, he suggested the plan of "keeping open for public use near the heart of the city a simple piece of pretty bottom-land of the very sort that Boulder Creek has been flooding over for countless centuries" as the cheapest way of handling the flood problem of Boulder Creek (Olmstead 1910).

In 1969, the city of Boulder was impacted by a moderate flood which caused $5 million in damages. The following decade marked the city's first serious effort in flood control. Initial investigations focused on the then-traditional flood mitigation techniques, such as hard-lining stream channels and using concrete structural facilities to channelize stream flow. However, these plans later contradicted the city's commitment to improve the quality of life and the urban environment and evoked considerable public opposition.

With the goal of maintaining and enhancing the aesthetic and environmental integrity of Boulder Creek and its tributaries, the city decided to pursue alternative solutions to flood control. In 1978, the city adopted a "non-containment" policy for Boulder Creek as part of the Boulder Valley Comprehensive Plan. This policy promoted ongoing city efforts to protect public safety by restricting development within the floodplain associated with Boulder Creek and its tributaries.

In 1984, the city adopted the Boulder Creek Corridor Plan which recommended development of a continuous path along the entire length of Boulder Creek to serve both as a flood hazard mitigation measure and a linear urban park for recreational and transportation use, as well as provide restoration and enhancement of wetlands and fish and wildlife habitat. Design Guidelines were established to set standards for appearance, quality and placement of elements which were incorporated in the Boulder Creek corridor. The Design Guidelines were drafted by the Parks and Recreation Department, with input from many other city departments. The Design Guidelines were reviewed and approved by the Parks and Recreation Advisory Board, Planning Board, Open Space Board of Trustees, City Council, the University of Colorado, and the Boulder Valley School District.

When completed in 1987, the Boulder Creek corridor provided not only recreational and transportation opportunities, but a buffer zone between the stream channel and nearby development as well. The buffer zone is designed to retain storm water which might otherwise cause considerably more damage in the event of a severe flood. Wetlands were created and enhanced along the corridor to provide water quality protection through the natural retention and filtering of storm water. Lands were purchased by the city to provide additional storm water retention or to remove structures from the high hazard zone[1].

The Boulder Creek project also preserved and/or enhanced the riparian environment along the creek, which had been considerably damaged. Natural vegetation was planted and corridor use was redirected to the Boulder Creek path to reduce on-going damage. Aquatic habitat, which had been severely affected by diminished stream flows and efforts to channelize the creek, was enhanced, and a self-sustaining creek channel and healthy aquatic habitat were established with the implementation of minimum stream flow agreements for Boulder Creek.

The Greenways Program was an outgrowth of the Boulder Creek Corridor Project. It was created on the basis of recognition that stream corridors are a vital link in the larger environmental system and that each stream is a natural and cultural resource. The public acclaim of the Boulder Creek project led to increased public discussion about the desirability of extending and continuing the concept of the Boulder

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[1] "High hazard zone" means those portions of the floodplain where an unacceptably high hazard to human safety exists, because the product number of flow velocity (measured in feet/second) times flow depth (measured in feet) equals or exceed four, or because flow depths equal or exceed four feet (Boulder Revised Code 9-2-2(a)).

Creek project along Boulder Creek's tributaries within the city.

The city designated over 20 miles of stream corridors along the following six tributaries of Boulder Creek for inclusion in the original Greenways Program:

South Boulder Creek
Bear Canyon Creek
Skunk Creek
Goose Creek
Wonderland Creek
Fourmile Canyon Creek

Elmer's Twomile Creek was later added as a tributary to Goose Creek because it was considered an important transportation corridor.

Other stream corridors were not included in the original Greenways Program because it was believed at the time the program was created that they were too pristine or completely lost to urban development.

Funding for a Greenways Plan was approved by City Council in December 1987. A master plan was developed for the Greenways Program by staff from the Planning, Public Works, Parks and Recreation and Real Estate and Open Space Departments. The first Tributary Greenways Master Plan was adopted by City Council in January 1989 and included the six designated tributaries to Boulder Creek. A refined Tributary Greenways Master Plan, design guidelines, a capital improvement program and a more detailed reproducible map were approved by Council in September, 1990. The intent of the original master plan was to articulate the overall policy direction for the Program. The map indicated a conceptual layout of the proposed trails and the design guidelines addressed environmental preservation and restoration, trail location and design, as well as privacy, safety and intermodal conflicts.

The Tributary Greenways Master Plan described the purpose of the Program as providing a unique opportunity for creating a comprehensive Greenways system for the community that can be creatively developed to function as storm drainage and flood channels, efficient bicycle and pedestrian transportation systems, open space and wildlife corridors and attractive recreation areas. It was immediately recognized that these purposes may conflict at times. With this in mind, staff has followed a design process predicated on public participation and conflict resolution. Each major project is publicly reviewed during the design process. This process includes participation by concerned neighborhoods, city boards, city staff, and other affected interests. It is built around the need to have neighborhood values, environmental values, and project needs integrated in the design of all projects.

Greenways projects are evaluated through the Community and Environmental Assessment Process (CEAP) which has been undertaken by one or more city advisory boards. (In the future, Greenways project CEAPs will be reviewed by the Greenways Advisory Committee, which is described in

Chapter IV.) Board recommendation(s) are subject to City Council review and approval. Additional opportunities for public comment and review are available through the various permitting processes associated with individual projects, and through the development of the annual city budget.

In August 1993, City Council directed the Greenways Coordinator to convene an interdepartmental team to update the Master Plan, with the major focus on the revision of the map. The Master Plan goals and criteria did not change substantially from the original Master Plan. Original and updated goals are presented in sections C and D, respectively. In addition, the update was to provide an evaluation of the successes of the Program to date, based on how well the goals and criteria of the Master Plan had been achieved, with identification of any mid-course corrections. This Master Plan update was to coincide with the Transportation Master Plan update, which was delayed for a number of years. The information requested was presented to Council on May 5, 1998.

The May 5, 1998 submittal to Council included an updated Greenways Master Plan map which depicted factual changes, including completed projects, as well as a Greenways Master Plan update survey which was completed by the National Research Center. The "Executive Summary" from the survey is provided as Appendix II-1 to this report. The Master Plan map was reviewed with recommendations for approval from the five boards that oversee the Greenways Program (Water Resources Advisory Board, Transportation Advisory Board, Parks and Recreation Advisory Board, Open Space Board of Trustees and the Planning Board).

On May 5, 1998, City Council approved the Greenways Map and directed staff to update the Greenways Master Plan. The Greenways Coordinator position was vacated soon after this direction was given, providing city staff an opportunity to reevaluate which work group would assume the responsibility of the Program and carry forth course direction. It was decided that in the near term, the Public Works Utilities Division would assume the responsibilities of the Greenways Program (formerly in the Public Works Transportation Division).

A public meeting was held in September 1998 to develop an approach for public involvement in the Master Plan update process. It was the group consensus that the process would involve numerous opportunities for public comment on a city staff written Plan. A core group of staff, representing multiple city divisions and departments was assembled to evaluate issues and participate in the development of the Greenways Master Plan update.

C. Purpose and Objectives of the Program

The 1989 goals and criteria of the program were as follows:

Goals and Criteria

A. Environmental Preservation/Restoration

1. To identify and preserve ecologically important areas, a biological assessment will be done during project design prior to construction.
2. Relatively intact areas of stream corridors which support slightly disturbed ecosystems

will be identified with the goal of preserving them.

3. Fish and aquatic habitat and wetland improvement opportunities will be considered as the corridors are developed.
4. Based on a careful analysis of need, a vegetation and planting program for each stream corridor will be implemented.
5. The city will pursue and develop water quality improvement strategies.

B. Trails and Recreation

1. Existing and proposed trails and bikeways are an important planning consideration and may be accommodated in or near the creek corridors.
2. Every effort will be made to respect the rights of adjacent property owners as greenways projects are designed and implemented. Specific trails may be redesigned, rerouted, or excluded from occurring on private property to protect individual privacy.
3. All tributary greenways improvements will be designed to be accessible to handicapped people where such access is reasonable.
4. To preserve the stream corridor environment and provide guidance for the design of trails, design guidelines have been developed.

C. General

1. The flood carrying capacity of creeks will not be reduced and, as a part of existing drainageway master plans, may be increased.
2. Selective acquisitions of property interests along the greenways will be pursued.
3. Critical portions of property and improvements will be sought by donation or dedication when property with creek frontage is developed, redeveloped, or annexed.
4. A coordinated management plan for maintenance of city land and improvements along the creeks will be developed.

The objectives of the 1989 Tributary Greenways Program are further described as follows:

1. Floodplain Management

Since most greenways are in stream corridors, they are subject to flooding. The integration of floodplain management techniques which preserve open space, protect existing vegetation, wetlands and wildlife habitat, and provide for connection between surface and ground water, is a goal of the Greenways Program.

2. Water Quality

Natural stream corridors, as well as streams which are reconstructed and revegetated to resemble natural channels, provide numerous water quality benefits. Since all tributaries carry water to Boulder Creek, the quality of water in streams is important regardless of the presence of permanent flow during dry spells. Most of these benefits cannot be duplicated in lined channels or channels without vegetation. Moreover, concrete lined channels provide little or no groundwater recharge. Therefore, stable natural and man-made stream channels which support

riparian vegetation should be preserved whenever possible. If stream channels must be intensively maintained or reconstructed, sound hydrological, ecological, and geological principles are to be followed. Preservation of water quality is also important in use of tributaries for fishing and wading activities. Non-structural design approaches can better support improved habitat and water quality goals.

3. Fish and Wildlife Habitat

Fish and wildlife habitat consists of areas which provide food, cover, and corridors for movement. Stream corridors with wide riparian and wetland zones provide some of the most valuable habitat in the semi-arid west. In the Boulder area, most wildlife species are dependent on stream corridors for one or more habitat functions. It is important to provide areas useful to wildlife through either protection of existing habitat or creating new habitat. Fish habitat may be created in streams with adequate flows and water quality. Existing pockets of good quality habitat are key to the re-population of enhanced habitat in the future.

4. Trails

The trails proposed under the Tributary Greenways Program provide connections between homes and neighborhood schools, employment and activity centers, as well as other trails and transportation facilities. In addition, these trails provide ample opportunities for recreational use.

Trails within stream corridors may conflict with wildlife habitat because of possible environmental impact and the presence of trail users. Where high value habitat is present, trail links are routed around the habitat.

Privacy is also a concern in residential neighborhoods when trail projects are being considered. Sensitivity in locating and designing trails to address privacy concerns is a priority. Various methods are used to provide buffering, including trail location and physical barriers such as plants, fences, distance, and grade separation. The design guidelines discuss this issue in detail.

5. Passive Recreation

In addition to recreation related to trails, other passive recreation is encouraged where environmental impacts will be acceptable and where appropriate real property interests have been secured. Passive recreation consists of activities which are not programmed such as photography, resting, bird and wildlife observation, picnicking, reading, fishing, walking, wading, etc.

6. Aesthetics

Proper scale and relationships between Greenways and their surroundings are important aesthetic considerations for the tributary Greenways. The landscape should be natural in character. Vegetation should be native and riparian in character and, in addition, natural stream

functions should be permitted to operate. Whenever possible, modifications to stream corridors are made to not appear to be obviously man-made except for trails and major related improvements.

Greenways Purpose Statement

As part of the process of updating the Master Plan, a purpose statement has been developed for the Greenways Program as follows:

The city of Boulder Greenways system is comprised of Boulder Creek and six of its tributaries:

- South Boulder Creek
- Bear Canyon Creek
- Skunk Creek
- Goose Creek
- Wonderland Creek
- Fourmile Canyon Creek

The Greenways Program seeks to coordinate and integrate as appropriate the following management objectives:

- riparian, floodplain & wetland protection and restoration (Habitat)
- water quality enhancement
- storm drainage (Flood Mitigation)
- alternative transportation routes for pedestrians and bicyclists (Trails)
- recreation
- protection of cultural resources

The Greenways Program has always been a multi-objective program. While all of the objectives of the Greenways Program can be addressed in separate programs, the Greenways Master Plan integrates these together as a special resource to allow coordinated action involving multiple departments. In evaluating the Greenways Program purpose, the inter-departmental staff group working on the Master Plan update proposed consideration of applying Greenways values for environmental, storm water management and recreational and trail system opportunities to include the city-wide tributaries and irrigation ditches. The intent of expanding the scope is to develop a more comprehensive planning tool for managing the entire Greenway/drainageway system to better integrate all of the multiple objectives of the greenways corridors throughout the city. Now that the surveys for Boulder Creek and the six identified tributaries have been completed, staff recommends at some point in the future to examine the remaining tributaries and irrigation ditches in the city of Boulder in ways that coordinate and integrate the six stated management objectives. However, funding to expand the program is not currently available.

D. Current Policies, Procedures and Practices that Dictate Service Levels

It can be seen from the above discussion that the objectives of the Greenways Program may conflict at times. With this in mind, staff has followed a planning and design process predicated on public participation and conflict resolution. Each major project is publicly reviewed during the design process. This process includes participation by concerned neighborhoods, city boards, city staff, and other affected interests. It is built around the need to have neighborhood values, environmental values, and project needs integrated in the design of all projects.

An evaluation of the current practices within the Greenways Program is divided into the following categories:

- Planning
- Design
- Construction
- Maintenance

Greenways Capital Improvement Program Development

The Transportation Division was responsible for administering the Tributary Greenways Program from 1989-1998. During this period, a Capital Improvement Program (CIP) was developed by the Greenways Coordinator, who was working under the direction of the Transportation Project Coordinator. The Tributary Greenways CIP identified specific capital projects for the upcoming year and the following year. Money was identified in the CIP for specific projects with the intent that those expenditures would take place in that year. Although money was designated for a particular project in the CIP, money was not always expended for that particular project during the year identified in the CIP.

The Greenways CIP program was developed in conjunction with the Transportation Division, Utilities Division, Parks Department and Open Space CIPs using an opportunistic approach. Greenways projects would be identified to complete the missing links in trail connections, flood improvements, habitat and stream restoration and water quality improvements. A master plan of improvements was developed on a blueline map, which identified projects based on all of the objectives of the Greenways Program. The blueline map was first developed in April, 1990, and updated in January, 1993, June, 1997 and November, 1997.

The initial Tributary Greenways CIP was developed in 1990 and has been updated annually by the Tributary Greenways Coordinator, working in association with other involved departments and divisions. In addition to CIP projects, the Tributary Greenways Coordinator also prepares budgets for on-going efforts such as signage, habitat surveys, corridor assessments and water quality and stream improvements.

At the beginning of every year, a work plan was developed for the Greenways Program, based on the CIP for that year. The funding splits between the three funds contributing to the Greenways budget were determined for each project by the Greenways Coordinator based on the program objectives

addressed by the components of each project and the relative participation in the project by each of the funding divisions.

In addition to specific capital projects, money was budgeted for miscellaneous trail connections, rest areas, signs, habitat surveys, corridor assessments and water quality and stream improvements. The Transportation Fund contribution was $300,000 per year, until 1999, when it was reduced to $150,000. Lottery Fund contributions consisted of 49.5 percent of the Fund until 1992, when contributions were reduced to $150,000 per year. Contributions from the Flood Control Utility Fund were $200,000 per year until 1995, when they were reduced to $150,000 per year. The current program budget is $450,000 contributed from the Transportation, Lottery and Flood Control Utility Funds.

In accordance with city policy, the preparation of the annual CIP for the Greenways Program has been coordinated by the Planning Department. The department selects capital projects for inclusion in the CIP based on priorities identified in the master plan. Project managers estimate the budgets for projects and determine CEAP requirements. The departments submit project descriptions and justifications, cost/revenue estimates, an evaluation of relevant citywide and master plan goals, and a discussion of CEAP requirements to the Planning Department for inclusion in the CIP.

The Planning Department reviews department CIP lists for consistency and accuracy. An interdepartmental staff team reviews the CIP for CEAP requirements. Suggestion are made to the department concerning CEAP requirements. The Planning Department compiles the citywide CIP for Planning Board and City Council review. The Planning Board conducts a CIP hearing and reviews the budget in terms of citywide project coordination, consistency with adopted master plans, balance among citywide goals and CEAP requirements.

Projects are planned and designed by city staff, in conjunction with appropriate outside consultants. Detailed planning and design efforts begin during the CEAP process for projects identified in the CIP for funding and construction. The design of each project is modified through the process based on public input, permit requirements and the development of more accurate information.

The Community and Environmental Assessment Process (CEAP)

The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. CEAP review consists of: a project description; a discussion of the Boulder Valley Comprehensive Plan and master plan goals that the project will address; a review of the impacts of the project in checklist form, and; a description of the proposed impact mitigation measures and their associated costs. The CEAP guidelines and checklist are contained in Appendix II-2.

CEAPs occur during the project planning and preliminary design phase of the Project Planning and

Approval Process. After funds have been appropriated for project planning in the CIP budget, a CEAP is conducted for selected major project alternatives to determine its preferred type, location, and conceptual design. The emphasis of the CEAP analysis at this stage of project planning is a general scoping of impacts and associated impact avoidance/mitigation strategies, in order to allow comparative impact assessment of major alternatives. The CEAP also provides the opportunity to balance multiple community goals through a public project by looking at a project within the context of the Boulder Valley Comprehensive Plan and master plans. The CEAP allows "fatal flaws" inherent in the conceptual design of a project to be discovered, thereby suggesting elimination of certain alternatives.

The CEAP documentation is submitted to Planning and Development Services for development review. If a site review or subdivision is required for the project, the appropriate applications are submitted concurrently with the CEAP. (Certain permits, as discussed below, are obtained in later phases of the project and are not submitted with the CEAP). The project manager then provides public notice of the CEAP application.

The Development Review Committee (DRC), reviews the CEAP, comments on the assessment and develops a recommendation. The project manager may redesign the project to address DRC comments and prepares a recommendation including DRC and public comments for advisory board review. The advisory board may approve the project and CEAP findings, suggest modifications, or deny approval. If modification to the project or CEAP are significant, it is resubmitted to Planning and Development Services for development review. The same process is continued until the project is accepted in concept by the advisory board. A revisiting of no-build and non-capital alternatives may be necessary if community and environmental impacts are deemed unacceptable. Advisory board decisions on the CEAP are subject to City Council call-up. In the future, Greenways project CEAPS will be reviewed by the Greenways Advisory Committee, plus other boards as warranted for projects of high interest.

Wetlands Permitting

Greenways projects are subject to two wetlands permitting processes. Section 404 of the Clean Water Act (33 U.S.C. 1344) prohibits the discharge of dredged or fill material into waters of the United States without a permit from the U.S. Army Corps of Engineers. Section 404 permitting requirements apply to all waters of the United States, including adjacent wetlands and tributaries to navigable waters of the United States. All projects which modify drainage channels and/or otherwise affect adjacent streamside vegetation generally require this type of permit. Most Greenways projects can be addressed through Corps of Engineers "nationwide permits", which authorize broad categories of projects such as maintenance, utility line backfill and bedding, etc. In applying for this type of permit, the city must describe its proposed project, describe project impacts, including effects to wetlands, and outline measures to be taken to avoid or reduce adverse effects to wetlands and to ensure full rehabilitation of disturbance following project completion. Where permanent loss of wetlands is unavoidable, restoration of nearby wetlands which have been damaged or degraded, at a rate exceeding the area of permanent loss, is generally required.

The city of Boulder has adopted a wetlands protection ordinance (BRC Title 9, Chapter 12) to preserve, protect and enhance wetlands by discouraging development activities in wetlands and adjacent areas. The ordinance establishes a goal of no-net-loss of wetland acreage and function by regulating activities in and around wetlands. These rules apply to all wetlands mapped within Boulder's city limits as well as all wetlands on city owned land, and all city activities affecting wetlands regardless of location. City wetlands permits are required for Greenways projects which affect wetlands and associated buffer zones surrounding wetlands along the designated tributary drainages.

Wetlands and surrounding buffer zones, which vary in size based upon the significance of the wetland, are referred to as "regulated areas". Any activity within a regulated area which reduces the extent of a wetland or reduces the degree to which a wetland performs any function requires a wetlands permit. However, maintenance of an existing public or private road, structure, or facility, including drainage facilities, water conveyance structures, dams, fences or trails, as well as any facility used to provide transportation, electric, gas, water, telephone, telegraph, telecommunications, or other services, are permissible, subject to the requirement of best management practices as identified in *City of Boulder Wetlands Protection Program Best Management Practices* (May 1995). The maintenance activities may not materially change or enlarge any existing facility, structure or road.

Wetlands permit applications contain a description of the proposed activity; a discussion of why avoidance and less damaging alternatives have been rejected by the applicant; a site plan; locations and specifications for all proposed regulated activities and the associated impacts; descriptions and statements concerning proposed fill materials; and a referral list for property owners within 300 feet of the project and other interested parties. The Floodplain and Wetlands Coordinator reviews wetlands permit applications and may refer them to the Planning Board. The Planning Board may call up wetlands permit applications within 14 days of the approval, and the City Council may call up Planning Board recommendations.

In order to obtain city wetlands permits, projects must minimize adverse impacts to a wetland and its functions and must not jeopardize the continued existence of habitat for plants, animals or other wildlife species listed by the federal government, State of Colorado, or in the Boulder County Comprehensive Plan as threatened, endangered, rare, special concern, of undetermined status, or critical. In addition, the project must be demonstrated to be in public interest in comparison to the anticipated effects. The permit may be conditioned to further reduce project impacts. A mitigation plan is typically required to provide restoration or creation of wetlands in order to offset losses resulting from the permitted activities.

Floodplain Development

Because of Boulder's location at the mouth of a canyon watershed, the city's creeks periodically flood. The city has developed zoning and land use programs, in addition to the construction of improved drainageways, diversions, and other structures to help prepare the city to deal with flooding more effectively.

Stormwater collection is separate from the wastewater system, allowing stormwater from streets and other paved areas to drain through a network of pipes directly to area creeks. In unpaved areas, overland flow from storms or excess irrigation may be collected through stormwater drains or will naturally percolate through the soil, eventually reaching groundwater.

Title 11, Chapter 5 of the Boulder Revised Code (BRC) establishes the development requirements related to stormwater within the city of Boulder. The City Manager is charged with the development of a master drainage plan for the city to include all completed or proposed drainage facilities required to carry surface waters without overflow or discharge, as well as all drainageways and basins that directly or indirectly affect drainage within the city. BRC 11-5-4 requires that all development of land within the city must ensure adequate drainage and management of storm waters and floods falling on or flowing onto the property.

Title 9, Chapter 9 of the BRC establishes the land use regulations which apply to the floodplains, conveyance zones and high hazard zones associated with drainageways within the city. To ensure compliance with these regulations, the property owner or building permit applicant must obtain a Floodplain Development Permit. The flood permit application includes an acceptable, detailed storm water and flood management plan which indicates the boundaries and specifications of any drainageways or facilities located on the property and provides for facilities necessary to ensure that storm waters and floods, including drainage from other lands that will contribute runoff to the property, will be controlled, as provided in the city of Boulder Department of Public Works, "Design and Construction Standards (November 2000). In addition, on-site detention storage, designed in accordance with the Design Criteria and Standard Specifications, is required for all developments other than individual single family lots that are not part of a larger development. In order to obtain a building permit for parcels of land through which a natural drainageway flows, the owner must grant the city at no charge a permanent easement to construct, maintain, or reconstruct the channel along the drainageway and provide a financial guarantee for the construction of drainage facilities shown in the approved master plan.

A Floodplain Development Permit is required for all development in the floodplain. General maps of the floodplain, which include high hazard, conveyance, and flood fringe zones, are maintained by the city's Floodplains and Wetlands Management Office. Greenways projects require a floodplain development permit because they involve construction of facilities within the floodplains of the drainages included in the program.

"Development Review" is the process established by the city to evaluate and make decisions concerning proposed developments. The Planning and Development Services group evaluates all water, wastewater, stormwater, flood management and transportation impacts of private development project for compliance with the Design and Construction Standards, master plans, policies, and other pertinent regulations. Where more than one permitting procedure is involved, a coordinated review process is used.

Floodplain Development Permit applications are reviewed by the Floodplain and Wetlands Coordinator, who provides public notice of the application (if high hazard or conveyance zones are affected) and makes a recommendation of approval, with or without conditions, or denial of the application. Among the concerns considered in the review of a floodplain development permit are compliance with regulations governing floodplains, conveyance zones and high hazard areas (BRC 9-9), effects on drainage efficiency or capacity, whether the project will have an adverse environmental effect on the watercourse, including banks and streamside vegetation, effect of the project on adjacent, upstream and downstream properties, the relationship of the project to the Boulder Valley Comprehensive Plan and applicable floodplain management programs, and whether the cumulative effects of the project with other existing and anticipated uses will increase flood heights.

Floodplain Development Permit applications for the conveyance and high hazard zones are referred to the City Council as an information item. The City Council may call up the staff approval within 21 days of the approval. If called up, the City Council reviews the application, holds a public hearing, and reaches a decision concerning the development.

Design

Greenways projects are designed in accordance with *Boulder's Greenways Design Guidelines*, adopted in March of 1989. The design guidelines build upon the Boulder Creek Corridor design guidelines adopted in April 1985 for the Boulder Creek project. While acknowledging that not all Greenways require alteration to meet the program objectives, the design guidelines establish a framework for projects that are undertaken by private landowners, developers, public agencies and city officials to ensure consistent, but creative development along the Greenways.

Design guidelines have been developed for:

- Stream corridor modifications, including channel modification and stabilization, construction of energy dissipaters and drop structures, and bank stabilization.
- Vegetation guidelines, including protection of existing vegetation, design and planting of new vegetation and revegetation guidelines.
- Trails and related facilities, including all types of trails, parallel trails, street crossings, underpasses, bridges, signs, railings, retaining walls, and measures implemented to protect the privacy of adjacent landowners.

Private landowners, developers, and public agencies outside of the city may be assisted by the city in either project design or implementation. The Greenways Coordinator is responsible for coordinating city assistance in these areas.

The Design Guidelines are in the process of being updated to better address environmental objectives and stream restoration practices.

Construction

Most Greenways projects are put out to public bid through the city's bidding process. If funding contributions are made from an outside public entity (e.g. CDOT, UDFCD or the County) their bidding process may be utilized. Smaller Greenways projects utilize contractors that have a continuing service agreement, with unit prices determined from an annual bid.

After award of a contract, projects are overseen by the Project Manager, Greenways Coordinator and city inspectors as needed. Construction is monitored to assure compliance with plans and specifications, permits, budget and any required field changes. At the time of construction completion, a final inspection is performed prior to project acceptance. A one year guarantee is normally required for most work. An new approach currently under evaluation is to include funding needed for on-going monitoring, maintenance and weed control in the project budget.

Maintenance

The Greenways corridors are curretnly maintained by several maintenance work groups within the city through informally agreed upon practices. Tasks are divided up by geographical location as well as by function. The responsibility of each work group is described below:

- Boulder County Parks and Open Space maintains the Boulder Creek path from the mouth of Boulder Canyon to Fourmile Canyon.
- The Parks Department maintenance staff is responsible for maintenance of Greenways that traverse a city park, as well as the Boulder Creek Path from Eben Fine Park to 55th Street.
- Street Maintenance is responsible for snow removal and general path maintenance (debris removal and sweeping) along all of the Greenways paths, except those portions of path maintained by the Parks Department.
- The Open Space and Mountain Parks Department is responsible for maintenance of natural, environmentally sensitive, or revegetated areas on open space land and easements. Currently this includes portions of Boulder Creek east of 38th Street and Arapahoe Avenue and portions of South Boulder Creek from KOA Lake to Marshall Road.
- Flood Utility Maintenance is responsible for maintaining the flood carrying capacity of all of the Greenways channels, which primarily involves removing tree limbs and downed trees from obstructing the flow in the channels, removal of channel sediment, and bank stabilization.
- Urban Drainage and Flood Control District (UDFCD) performs maintenance on sections of Boulder Creek and all tributaries included in the Greenways Program.
- City Forestry, University of Colorado (CU), ditch companies, and Xcel Energy are also involved in maintenance along the Greenways.

Within the city of Boulder there are currently 47 total miles of multi-use paths, 17 miles of which are Greenways paths. The Parks and Recreation Department maintains the Boulder Creek path, which is approximately 5.5 miles long. The University of Colorado, Boulder County and private entities maintain approximately 13 miles of the system, and the Streets and Bikeways Maintenance work group

maintains the remaining 28.5 miles, which includes both Greenways and non-Greenways paths. The Streets and Bikeways Maintenance budge for maintaining these 28.5 miles of multi-use paths is currently $267,388 per year including personnel expenses. A one-time allocation of $30,000 for a truck was also received in 2001. In addition, the Transportation Division's current budget for major maintenance of bikeways is $175,000. This is utilized to replace bridges and significant sections of path.

The Parks Department has one full time and two, 16-week seasonal employees involved in maintenance of city parks, including Greenways corridors and the Boulder Creek corridor. There are approximately 5.5 miles of Greenways that traverse city parks.

The Open Space and Mountain Parks Department is responsible for maintenance of natural, environmentally sensitive, or revegetated areas on open space land and easements. Currently, this includes portions of Boulder Creek east of 38th Street and Arapahoe Avenue and portions of South Boulder Creek from KOA Lake to Marshall Road. There are approximately 4.8 miles of concrete trails within the Greenways system that coincide with Open Space land (this does not include soft surface trails which serve as part of the Greenways system, such as South Boulder Creek Trail from the East Boulder Community Center to Marshall Road).

Flood Utility Maintenance is responsible for maintaining the flood carrying capacity of all of the Greenways channels, which primarily involves removing tree limbs and downed trees from obstructing the flow in the channels, removal of channel sediment, and bank stabilization. Adjacent landowners are required to handle leaning trees or trees that have fallen away from the creek channel. The Flood Utility has a budget of approximately $82,000 for maintenance of flood carrying capacity of the creek channels within the city. The budget provides for 1.8 FTE, approximately $51,000 in personnel costs and $30,000 for non-personnel costs.

The Urban Drainage and Flood Control District (UDFCD) is responsible for maintaining and preserving floodways and floodplains in areas eligible for UDFCD maintenance and funded by the UDFCD. The Urban Drainage and Flood Control District (UDFCD) performs maintenance on sections of Boulder Creek and all tributaries included in the Greenways Program. UDFCD maintenance is limited to facilities that are publicly owned or are in a public drainageway easement and are categorized into routine, restoration and rehabilitation projects. Routine maintenance consists of scheduled mowings and trash and debris pickup on major drainageways during the growing season. It may also include small revegetation efforts and limited weed control. Restoration projects address local erosion problems, existing structure repair, detention pond restoration, tree thinning, removal of sediment deposits from flood control facilities and revegetation work. Rehabilitation projects are major reconstruction efforts that would be included as CIP projects in the city of Boulder.

The City Forester is responsible for full service for trees on city street rights-of-way and within city parks. There is no spraying or tree replacement program. Forestry is responsible for contracting out

pruning and removal work along Boulder Creek adjacent to park sites. They also provide monitoring of tree health conditions along the entire length of Boulder Creek from the mouth of Boulder Canyon to Stazio Ball Fields. This office is the one generally contacted by the public concerning tree issues. It is common for the City Forester to determine who is responsible for tree problems reported by the public.

Where the city has easements along the greenways, maintenance of the corridor off the paths and path shoulders usually lies with the landowners. In general, the city maintains the trail and flood components associated with a greenway, while weed control, tree maintenance, etc. off paths and path shoulders are landowner responsibilities unless otherwise stated.

Maintenance standards have been developed to reflect the multiple objectives and uses of Greenways segments. Current and proposed maintenance programs are compared in Chapter VIII.

E. Summary of Past Funding

The Tributary Greenways Capital Improvement Program funding between 1991 and 2001 was as follows:

- Transportation Funds: $300,000 per year until 1999, when funding was reduced to $150,000 per year.
- Lottery Funds: 49.5 percent until 1992, when it was reduced to $150,000 per year.
- Flood Control Utility Funds: $200,000 per year until 1995, when funding was reduced to $150,000 per year
- Other funds, including state, federal and district grants, and private donations.
- Projects undertaken by the Greenways Program are supplemented by projects and project components which are funded directly by the Transportation Division, Flood Control Utility, Open Space, and Parks Department, or which are constructed by private developers.

Transportation funds are administered by the Public Works Department and have been used to construct trails and related facilities which provide a transportation benefit. Flood Control Utility funds are administered by the Public Works Department and have been used for improvements providing or maintaining flood safety along streams, including such things as box culvert installation, channel restoration, and bank and channel stabilization. Many of these projects include aquatic habitat improvements as well as wetland and riparian corridor restoration which also provide terrestrial habitat and storm water quality improvements. Lottery funds are administered by the Parks and Recreation Department and have been used for trail and related facility construction, environmental rehabilitation projects, and passive recreational improvements.

The city's Capital Improvement Program (CIP) is a six-year plan for public physical improvements. The CIP provides a forecast of funds available for capital projects and identifies all planned capital improvement projects and their estimated costs for the six-year period. The process is coordinated by the Planning Department and evaluated by the Planning Board. The Planning Board makes

recommendations to the City Manager and City Council regarding project consistency with the long-term goals and policies of the Boulder Comprehensive Plan, the scope, priorities, and scheduling of CIP projects, the resolution of policy issues raised by project location and design, and Community and Environmental Assessment Process requirements for each project.

The Greenways Program has adopted an opportunistic approach to achieve multiple objectives throughout the system. Frequently, specific efforts within a greenway corridor can be completed in conjunction with transportation, flood hazard mitigation, or private development projects funded from outside the Greenways budget. Major outside funding from such sources as the Urban Drainage and Flood Control District (UDFCD), the Colorado Department of Transportation (CDOT), and Federal Aid for Urban Services (FAUS) has allowed the Greenways system to expand and complete projects at an accelerated rate, with a much lower direct cost to the city. Cooperation with the University of Colorado and the Boulder Valley School District has resulted in extension of Greenways facilities through properties owned and managed by those entities. Through the site review process, private developers may provide conservation easements to the city along the program tributaries, as well as fund and construct trail links, park connections and underpass installations.

Coordination with the UDFCD concerning potential funding availability is an on-going process involving Utilities staff. The city attempts to coordinate its CIP, which is prepared in June, with the UDFCD CIP which is prepared in September to October of each year. The focus of city involvement with UDFCD has been in the areas of master planning, maintenance, and capital improvement projects The city is currently cooperating with UDFCD and Boulder County in master planning efforts for Fourmile Canyon Creek, South Boulder Creek and sections of Wonderland Creek. The UDFCD may contribute up to 50 percent of study costs for multi-jurisdictional master planning efforts. The UDFCD may also contribute matching funds for master-planned CIP projects which are requested, owned and maintained by local governments. These projects then become eligible for UDFCD maintenance funding.

UDFCD funding of the Greenways Program has been substantial. Total construction expenditures by the UDFCD within the city since 1969 are approximately $9.2 million. Examples of projects completed with significant UDFCD participation include flood conveyance capacity increases from 28th to 30th Streets on Fourmile Canyon Creek, the Mohawk underpass on Bear Creek, the Martin to Moorhead Bear Creek channel improvements, and the 1996 Boulder Creek bank stabilization efforts at Eben Fine Park.

Transportation project funding from the Colorado Department of Transportation and the Federal Aid Urban System (FAUS) have also contributed to the achievement of Greenways objectives. FAUS contributions, which pertain to transit projects and the secondary network of roads that serve local urban transportation needs, were used in the completion of the Valmont Connector project on South Boulder Creek, as well as portions of the Bear Creek trail.

Projects by private developers have resulted in the construction of trail segments and environmental

restoration efforts along portions of the Greenways system. Private developers contributed to the trail construction, flood conveyance improvements, channel restoration and wetland creation projects from Kalmia to the Diagonal on Wonderland Creek, Fourmile Canyon Creek corridor projects from 28th Street through the Palo Park Subdivision, Wonderland Creek from 47th Street to Valmont, and portions of the Boulder Creek path.

F. Chronology of Projects and Categorization Based On Program Goals

The Chronology of Greenways Projects by Year (Table II-1) lists all of the projects funded through the Greenways budget. A project description is provided with an explanation of the goals, as well as the distribution of funding within the Greenways budget.

Additional projects were constructed within the Greenways system through funding sources outside the Greenways budget. All of the projects constructed within the Greenways system since 1985 are listed in Table II-2, titled Funding Contributions Toward Greenways Objectives, 1985-2000.

The following paragraphs provide a general overview of projects within each creek corridor. A list of all of the tributaries along with their basin size and length through the city is included in the Appendix II-3 of this master plan, along with a map showing their location.

Boulder Creek Project 1985-1987

The Boulder Creek Corridor Plan was adopted by the city in 1984. The completion of the Boulder Creek path in 1987 marked the successful integration of multiple objectives. Since 1987, the Greenways Program has continued to develop and enhance the Boulder Creek corridor. In 1993, the trail through the Boulder High School area was relocated to the north bank of the creek as part of a major flood control project. Restoration and replacement of creek side vegetation was undertaken at Eben Fine Park in 1996, and numerous rest areas were built.

Fourmile Canyon Creek

Trail construction and wetlands preservation work was performed in the section of Fourmile Canyon Creek between 28th and 30th Streets in 1991 by the Greenways Program. In 1995, an underpass was constructed under Broadway along Fourmile Canyon Creek. This was funded through the Transportation Division budget utilizing Transportation Excise Tax funds. Contributions were also made from the Greenways budget. The section of the Fourmile corridor between Broadway and 28th Street has not had any trail improvements except for the construction of a trail connection in 1997 from Tamarack to Riverside, which was funded by Greenways Program. The trail was continued east from 30th to 47th Streets as a part of the Palo Park subdivision development, using developer funds in conjunction with the Parks Department development of the Pleasant View Soccer Complex. Wetlands occur intermittently along this reach, which also includes sensitive riparian habitat, and a wetland restoration site is located in this area. Trail construction and channel improvements were made in 1998 from Yellow Pine Avenue to Broadway. This work was funded through the Greenways budget and the Urban Drainage District Maintenance Funds. The city is currently preparing a Fourmile

Canyon Creek Master Plan in conjunction with the UDFCD.

TABLE II-1
CHRONOLOGY OF GREENWAYS PROJECTS BY YEAR (1985-2000)

DRAINAGE	PROJECT	DESCRIPTION/GOALS	FUNDING BY GREENWAYS BUDGET SOURCE WITHIN GREENWAYS BUDGET
1985-1987			
Boulder Creek	Boulder Creek Project	Comprehensive Greenway corridor from Eben Fine Park to 55th Street; completed according to the approved Boulder Creek Master Plan.	
1989			
Skunk Creek	CU Research Park	Stream channel reconstruction, flood control improvements, wetland and pond creation, water quality improvements, trail construction.	University of Colorado
1991			
South Boulder Creek	55th to Central	Trail construction, including a new bridge and low water crossing.	$148,000 (Lottery)
South Boulder Creek	Central to Stazio	Trail construction including low water crossing and railroad underpass.	$ 67,000 (Lottery) $ 70,000 (Flood Control)
Bear Creek	Baseline to US 36 though CU property	One underpass and trail connections to CU Main campus, Apache Trail and Williams Village.	$ 8,700 (Transportation) $ 58,000 (Flood Control (FAUS)

Fourmile Creek	28th to 30th Street	Flood conveyance capacity increase, wetlands preservation, and trail construction.	$ 6,000 (Lottery) $ 13,000 (Urban Drainage)
1992			
Wonderland Creek	Broadway Underpass	Flood capacity increase, channel restoration, riparian vegetation restoration, wetland and pond creation	$ 45,000 (Transportation)
Wonderland Creek	Valmont Underpass	Flood capacity increase, trail underpass	$ 30,000 (Transportation) $ 45,000 (Flood Control) (FAUS)
South Boulder Creek	Valmont Connector	Channel restoration to natural configuration, wetland creation, riparian vegetation planting, trail connection and underpass	$ 53,000 (Transportation) $ 3,000 (Flood Control) (FAUS)
Skunk Creek	Colorado to Aurora 7	Trail construction from the crossing under Colorado Avenue to Wellman Canal, wetlands creation	$ 50,000 (Bikeways) $ 5,000 (Flood Control)
Bear Canyon Creek	Baseline through Park East (Wellman Canal to Mohawk)	Trail reconstruction.	$ 57,000 (Lottery) $ 50,000 (Flood Control) $ 89,000 (Bikeways)

South Boulder Creek	Stazio to Arapahoe	Paved trail construction, railroad underpass, wetland creation.	$ 57,000 (Lottery) $ 6,000 (Transportation) $ 55,000 (Flood Control)
1993			
Wonderland Creek	Kalmia to the Diagonal	Flood improvements, channel restoration, riparian forest preservation, wetland creation, and trail.	Developer and city funds
Bear Canyon Creek	Mohawk to Gilpin	Riparian habitat widening and restoration, wetland creation, landscaping and two underpasses, trail construction.	$ 28,000 (Lottery) $ 55,000 (Transportation) $ 84,000 (Flood Control)
South Boulder Creek	Arapahoe Underpass	Trail underpass.	$ 93,000 (Lottery) $ 55,000 (Transportation) $ 45,000 (Flood Control)
South Boulder Creek	EBCC Pedestrian Bridge	New trail bridge and soft-surface trail approaches.	$ 18,000 (Lottery) $ 2,000 (Flood Control)
Boulder Creek	Boulder HS Trail (N. side of creek)	Relocation of Boulder Creek trail.	$ 56,000 (Transportation) $ 9,000 (Flood Control)
1994			
Wonderland Creek	Kalmia to 28th Street	Trail and flood improvements.	Developer funds $ 48,000 (Lottery) $ 18,000 (Transportation)

Bear Canyon Creek	Martin to Moorhead	Food improvements, two underpasses, trail connections.	$148,000 (Lottery) $335,000 (Transportation) $599,000 (Flood Control)
1995			
Fourmile	Broadway Underpass	Trail underpass and flood capacity improvements.	$ 4,000 (Lottery) $ 75,500 (Transportation) $ 10,000 (Flood Control)
Goose Creek	Trail Connection to Pearl Street	Trail connection.	$ 47,000 (Transportation) $ 22,000 (Flood Control)
Goose Creek	Trail Connection at 30th Street	Trail through new 30th Street underpass to Mapleton	$ 9,000 (Transportation) $ 1,000 (Flood Control)
Bear Creek	Mohawk Underpass	Trail underpass and flood capacity improvements.	$ 93,000 (Transportation) $ 75,000 (Flood Control) $200,000 (Urban Drainage)
1996			
Boulder Creek	13th and Arapahoe Rest Stop	Trail rest area.	$ 10,000 (Lottery) $ 3,000 (Transportation) Private Donation
Boulder Creek	Library to Justice Center Trail Reconstruction	Trail relocation, riparian zone restoration.	$ 53,000 (Transportation) $ 6,500 (Lottery)
1997			
South Boulder Creek	Baseline to EBCC	Underpass, habitat restoration and trail connection.	$ 61,000 (Transportation) $ 82,000 (Lottery) $ 52,000 (Flood Control)

Boulder Creek/Skunk Creek	Rest Area	Trail rest area.	$ 4,000 (Lottery) $ 7,000 (Transportation) $ 4,000 (Flood Control)
Fourmile Creek	Trail Connection - Tamarack to Riverside	Trail connections.	$ 12,000 (Lottery)
Bear Creek	Gilpin Underpass	Flood control, pedestrian and bicycle underpass.	$ 6,500 (Lottery) $ 63,000 (Flood Control) $211,000 (Transportation) $ 97,000 (Urban Drainage)
1998			
Fourmile Creek	Yellow Pine Avenue to Broadway	Trail construction and channel improvements	$100,000 (Transportation) (Urban Drainage Maintenance funds?)
Boulder Creek	Teahouse Trail	Trail relocation and two bridges	
1999			
Fourmile Creek	Yellow Pine to Broadway	Wetland planting and low water crossing	$55,000
Fourmile Creek	Pleasantview Soccer Field	Wetland planting and low water crossing	$28,000
Fourmile Creek	At Sumac	Trail connection	$25,000
2000			
South Boulder Creek	At Baseline	Trail restoration	$6,000 (Urban Drainage)
Boulder Creek	At 55th	Streambank restoration	$6,000 (Urban Drainage)

TABLE II-2
FUNDING CONTRIBUTIONS TOWARD GREENWAYS OBJECTIVES, 1985-2000

TRIBUTARY	REACH	TRAIL	FLOOD	WATER QUALITY	HABITAT	RECREATION	CULTURAL RESOURCES
Fourmile	West of Broadway	G 1998 UDFCD	G 1998 UDFCD				
	Broadway Underpass	G 1995 T 1995	G 1995	G 1995	G 1995		
	Broadway to Violet						
	Violet to 19th St.						
	19th to 26th St.	G 1999 (Sumac)					
	Tamarack to Riverside	G 1997					
	26th to 28th St.					P/R 1999	
	28th to 30th	G 1991 UDFCD	G 1991 UDFCD	G1991 UDFCD	G 1991 UDFCD		
	30th to 47th Palo Park Sub	P UDFCD	P UDFCD				
	30th to 47th Fourmile Creek Sub	P	P	P G 1999	P	P/R	
	47th St. to Diagonal & Underpass	CDOT T	CDOT T				
	RR & Old Diagonal Underpasses						
Wonderland	Broadway Underpass	G 1992 T 1992	G 1992 T 1992	G 1992 T 1992	G 1992 T 1992		
	Broadway to 19th St.						
	19th to 26th St.						
	26th to 28th St.	UDFCD G 1989	UDFCD G 1989				
	28th to Kalmia	G 1994 P T	G 1994 P				
	Kalmia to Diagonal	G 1993 P	G 1993 P	G 1993 P	G 1993 P		
	Diagonal to Foothills						
	Foothills to Valmont	P T	P	P G 1999	P	P/R P	
	Valmont Underpass	G 1992 T 1992	G 1992 T				
	Valmont to N. Goose	G 1999	G 1999 UDFCD	G 1999	G 1999	P/R 1999	

G= Greenways F=Flood T=Transporatation UDFCD=Urban Drainage and Flood Control District
OS=Open Space P/R=Parks CDOT-CO. Dept. Transportation *=Federal funding P= Private

TRIBUTARY	REACH	TRAIL	FLOOD	WATER QUALITY	HABITAT	RECREATION	CULTURAL RESOURCES
Goose Creek	19th to Folsom	P					
	Folsom to 28th						
	28th to 30th St.	F 1999 UDFCD	F 1999 UDFCD	F 1999 UDFCD	F 1999 UDFCD		
	30th to Foothills	F 1993 UDFCD G 1995	F 1993 UDFCD	F 1993 UDFCD	F 1993 UDFCD		
	Foothills to Pearl	G 1995					
North Goose	Foothills to Wonderland		F UDFCD				
	Wonderland to Bldr Creek	T 1986-88	F UDFCD				
South Goose	Foothills to Bldr Creek	P 1986-88	F UDFCD	F UDFCD	F UDFCD		
	Rest Area	P					
Elmers Twomile	26th to Iris						
	Iris to Glenwood	F UDFCD				P/R 1999	
	Glenwood to Valmont	F UDFCD					
	Valmont to Goose						
Boulder Creek							
	Fourmile Canyon to Underpass	County					
	Underpass	CDOT					
	Underpass to Eben Fine	T					
	Eben Fine to 6th St	BCP	UDFCD 1997	UDFCD 1997			
	white water course					P/R P	
	6th St. to 9th St	BCP					
	9th to Broadway	BCP G 1996					
	13th & Arapahoe Rest Area	BCP G 1996					
	Teahouse Trail	G 1998					

G= Greenways F=Flood T=Transporatation UDFCD=Urban Drainage and Flood Control District
OS=Open Space P/R=Parks CDOT-CO. Dept. Transportation *=Federal funding P= Private

TRIBUTARY	REACH	TRAIL	FLOOD	WATER QUALITY	HABITAT	RECREATION	CULTURAL RESOURCES
	Broadway to 17th	BCP G 1993	F 1992 UDFCD				
	17th to Folsom	BCP					
	Folsom to 28th St.	BCP UDFCD 1999	UDFCD 1999				
	28th to 30th St.	BCP					
	30th to Foothills	BCP					
	Foothills to 55th St.	BCP UDFCD 1999	UDFCD 1999				
	Pearl Parkway Valmont Bridge	County T 1999	County T UDFCD	County T UDFCD			
	Pearl Parkway	T 1999					
Skunk Creek							
	Hollyberry to NOAA	T 1997					
	NOAA to Broadway	T 1999/2000					
	Broadway Underpass	T * 1999	T * 1999 F 1999				
	Broadway to Moorhead	T *					
	Hwy 36 Underpass	T * 1994 CDOT					
	Moorhead to Baseline	T * 1994 CDOT					
	Baseline Underpass	T * 1996					
	Baseline to 30th St.						
	28th Street on ramp Underpass	T * 1994					
	30th to Colorado						
	Colorado Underpass	T					
	Colorado to Boulder Creek	CU 1989	CU 1989	CU 1989	CU 1989		
	Boulder Creek Rest Area	G 1997 P					
	Colorado to Aurora 7	G 1992 P					

G= Greenways F=Flood T=Transporatation UDFCD=Urban Drainage and Flood Control District
OS=Open Space P/R=Parks CDOT-CO. Dept. Transportation *=Federal funding P= Private

TRIBUTARY	REACH	TRAIL	FLOOD	WATER QUALITY	HABITAT	RECREATION	CULTURAL RESOURCES
Bear Creek							
	Mts. to Lehigh						
	Lehigh to Broadway						
	Broadway Underpass	T * 1998	T * 1998 F UDFCD	T * 1998 F UDFCD			
	Broadway to Martin	T 1998,2000 F 1998	F 1998 UDFCD	F 1998 UDFCD	UDFCD 1999		
	Martin Underpass	G 1994 T UDFCD	G 1994 T UDFCD				
	Martin to Moorhead	G 1994 T UDFCD	G 1998 F UDFCD				
	Moorhead Underpass	G 1994 T UDFCD	G 1994 T UDFCD				
	Moorhead to Hwy 36	T					
	Hwy 36 Underpass	T					
	Hwy 36 to Baseline	G 1991 T *					
	Baseline Underpass	T *					
	Baseline to Gilpin	G 1991 T *					
	Gilpin Underpass	G 1997 T	G 1997				
	Gilpin to Mohawk	G 1993	G 1993	G 1993	G 1993		
	Mohwak Underpass	G 1995	G 1995				
	Mohawk to Colorado	G 1992	G 1992				
	Colorado to Arapahoe	CDOT					
	Arapahoe to Boulder Creek	CDOT					
South Boulder Ck							
	Broadway to Hwy 36	OS 1985, 1998			OS 1998, 1999		OS 1997
	Hwy 36 to South Boulder Rd.	OS 1985			OS 1994, 97, 98		OS 1997
	EBCC Pedestrian Bridge	G 1993					

G= Greenways F=Flood T=Transporatation UDFCD=Urban Drainage and Flood Control District
OS=Open Space P/R=Parks CDOT-CO. Dept. Transportation *=Federal funding P= Private

TRIBUTARY	REACH	TRAIL	FLOOD	WATER QUALITY	HABITAT	RECREATION	CULTURAL RESOURCES
	South Boulder Rd to EBCC	OS 1994			OS 1997, 1998		OS 1997
	EBCC to Baseline	G 1997 OS 1994			OS 1980s,1998	OS 1994	OS 1997
	Baseline Underpass	G 1997 T UDFCD 1999					OS 1997
	Baseline to Arapahoe	T					
	Arapahoe Underpass	G 1993					
	Arapahoe to Stazio	G 1992 T	G 1998	G 1992	G 1992		OS 1997
	Stazio to Central	G 1991	G 1998				OS 1997
	Stazio Connection	G 1992					
	Central to 55th	G 1991					OS 1997
	55th to Valmont	G 1992 T *		G 1992	G 1992		

G= Greenways F=Flood T=Transporatation UDFCD=Urban Drainage and Flood Control District
OS=Open Space P/R=Parks CDOT-CO. Dept. Transportation *=Federal funding P= Private

Wonderland Creek

Box culverts were installed under Wonderland Creek's Broadway and Valmont crossings in 1992, with Transportation contributions to the Greenways Program. Trail construction and channel improvements from 28th Street to Kalmia were begun in 1993 with developer funds and continued in 1994 using Greenways Program funds. Trail construction, channel improvements, riparian forest preservation, and wetland creation were completed in the Wonderland Creek corridor from Kalmia to the Diagonal as a joint city/private developer project in 1993 and 1994. In cooperation with the Urban Drainage District, the trail between 26th Street and 28th Street was completed in 1989. The city is currently cooperating with the Urban Drainage District in the preparation of a master plan for Wonderland Creek for the areas between 28th Street and Foothills Parkway.

Goose Creek

Two Greenways Program projects have been completed on Goose Creek. During 1995, trail connections between Pearl Street and 30th Street were constructed. Flood control improvements were completed by the Urban Drainage and Flood Control District in the 30th Street to Foothills Parkway segment of Goose Creek in 1993. Additional flood control improvements are currently under construction in the 28th to 30th Streets reach by the city and the Urban Drainage and Flood Control District. The Flood Control Utility and UDFCD completed trail construction, flood hazard mitigation work, water quality protection and habitat improvement projects along the section of creek from 30th Street to the Foothills Parkway in 1993. In 1995, the trail was completed from Foothills Parkway to the Pearl Parkway by the Greenways Program. Trail construction, flood hazard mitigation, and water quality and habitat improvements within the section of creek from 28th to 30th Streets is scheduled for 1999. Trail construction, water quality and habitat improvements associated with development of a park are also being constructed in the section of the Elmer's Twomile Creek reenway between Iris and Glenwood.

Elmer's Twomile Creek

The UDFCD did flood improvements to Elmer's Twomile Creek between 26th Street and Glenwood. The Parks Department plans to receive bids for park, habitat and path construction between Iris and Glenwood during the Fall of 2001. Federal funding for an underpass under Iris Avenue has been granted and is scheduled for distribution in 2003. Construction of flood mitigation and trail improvements from Goose Creek north to Valmont is anticipated to begin during 2002.

Skunk Creek

In 1989, the University of Colorado completed Skunk Creek stream channel reconstruction, flood control improvements, wetland and pond creation, water quality improvements and trail construction from Boulder Creek to Colorado Avenue in conjunction with the development of the CU Research Park. The Greenways Program completed the trail from the crossing under Colorado Avenue to the Wellman Canal near Aurora 7 School in 1992. This project also included wetlands creation. The city installed underpasses beneath Baseline, U.S. 36 and the U.S. 36 on ramp at Baseline as a component of the 1995-1996 bridge replacement project on U.S. 36. In 1997, a rest area was constructed near

the Skunk Creek confluence with Boulder Creek, south of Arapahoe Avenue. An underpass at Broadway was constructed by the Transportation Division in 2000. A master plan is currently being completed for the segment of Skunk Creek between Broadway and U.S. 36.

Bear Canyon Creek

The city's initial efforts to address flood hazard mitigation for Bear Canyon Creek occurred in 1991, when an underpass at Baseline and trail connections to the CU main campus were constructed. In 1992, trail reconstruction was completed between the Wellman Canal and Mohawk Drive. In 1993, the trail was extended between Mohawk and Gilpin Drives. This project also included riparian habitat widening and restoration, wetland creation, landscaping, and the construction of an underpass at Arapahoe Avenue and a low water crossing downstream of Mohawk Drive. An underpass beneath Mohawk Drive was added in 1995. Flood capacity improvements and trail connections, as well as underpasses beneath Martin and Moorhead, were completed in 1996. In cooperation with the Urban Drainage and Flood Control District, additional flood improvements were completed and a pedestrian and bicycle underpass was added at Gilpin Drive. During 1998, the city worked with the Boulder Valley School District to enhance riparian vegetation near Martin Park Elementary School to create a nature education area. From 1997-1998, a pedestrian/bicycle underpass and associated flood improvements were completed at South Broadway and Bear Canon Creek. Modifications to Martin Park allowed the entire 100-year flood to be contained within the park property, removing approximately 200 properties from the 100-year floodplain. The project also provided storm water quality opportunities for a major storm sewer outfall into Bear Canyon Creek.

South Boulder Creek

The Greenways Program began work in the South Boulder Creek corridor with trail construction, including a new bridge and low water crossing, between 55th and Central Avenue in 1991. Also in 1991, a trail was constructed between Central Avenue and the Stazio Ballfields. This project included a low water crossing and a railroad underpass. During 1992, the trail was extended around Valmont Reservoir to Valmont Road and an underpass beneath Valmont Road was constructed. In conjunction with this effort, the creek channel was restored to its natural configuration, wetlands were created and riparian vegetation was planted. Also during 1992, paved trail construction, a railroad underpass and wetlands creation efforts were completed between the Stazio Ball Fields and Arapahoe Road. In 1993, a trail underpass was constructed beneath Arapahoe Road. A new trail bridge and soft-surface trail approaches were created from the South Boulder Creek corridor west toward the East Boulder Community Center. During 1997, the Greenways Program constructed a trail underpass beneath Baseline Road and completed the trail connection between South Boulder Creek and the East Boulder Community Center. The city is currently participating in South Boulder Creek master planning efforts in association with the Urban Drainage and Flood Control District, Boulder County and the University of Colorado.

G. Survey of Current Resources

As a part of the Greenways Master Plan update, an inventory of existing conditions, reflecting the six objectives of the program, was compiled for each of the tributaries by stream reach. This inventory (Table II-3) was developed and reviewed in consultation with the interdepartmental work group involved in the master plan update. The inventory matrix was provided to the public for review at the June 8, 1999 open house to discuss the master plan update.

Identification of future Greenways opportunities for development and enhancement was based upon:

- A comprehensive, city-wide habitat evaluation to identify areas where restoration and enhancement programs will result in the greatest benefits;
- identification of special concern species and their habitats;
- wetlands preservation/restoration opportunities;
- recreation opportunities;
- bikeways opportunities;
- on-going flood hazard mitigation objectives;
- opportunities for protection and enhancement of the cultural environment; and
- opportunities to provide water quality improvements.

Environmental Resources

In keeping with guidance from the original Tributary Greenways Master Plan, the city continues to recognize that environmentally sensitive and ecologically important areas occur along the stream corridors, particularly on the fringes of the urban area. These include nesting areas for birds, critical habitat for terrestrial and aquatic wildlife, important wetland areas, and riparian corridors in general.

A frequent comment concerning the implementation of the Greenways Program has been the need to examine environmental resources and impacts on a project-specific basis. In the past, wildlife corridors and habitat have been documented in the course of preparation of project-specific CEAP analyses. In its August 1993 direction on the update, the City Council specifically stated that Greenways CEAPs would be conducted on logical stream reaches instead of the previous project-specific basis.

Wildlife Habitat

During the summer of 1999, the city began a city-wide habitat evaluation project to identify areas where restoration and enhancement programs will result in the greatest benefits. This study was conducted using a standardized methodology developed specifically for the Greenways system. The goal of this assessment was to evaluate the quality of urban, terrestrial habitat along Boulder Creek and its tributaries to better achieve the program goal of protecting and restoring riparian areas, floodplains and wetlands within the Greenways system. A series of habitat assessment factors pertaining to the physical, biotic and human use components of each tributary were developed along with assessment methodologies which would provide a systematic and objective evaluation of each riparian area. The study was designed to facilitate comparison of habitat values with the competing goals of trails, recreation and flood hazard mitigation during the planning phase for each Greenways project. This

information was used to identify and prioritize environmental projects (see Chapter VII).

Sensitive Species

In conjunction with the wildlife habitat assessment study, habitats of species of national, state and local concern were identified using federal and state standards and guidelines, Colorado Natural Heritage Program information, and data from the U.S. Fish and Wildlife Service and Boulder County agencies. Due to the location of the Greenways system along drainages, the Greenways corridors often encompass suitable habitat for two federally-listed species, the Ute Ladies'-Tresses Orchid and the Preble's Meadow Jumping Mouse. Some areas of suitable habitat for these species have been identified on the current master plan map. The black-tailed prairie dog is a species of current local/state concern for which suitable habitat also exists within the Greenways corridors.

Opportunities for protection and enhancement of sensitive species habitat were identified and these opportunities will be reflected in future Greenways project development.

Corridor Landscaping and Wetlands Preservation and Restoration

The Greenways corridors contain numerous opportunities for the preservation, restoration and creation of wetlands. Wetlands creation/enhancement projects are also opportunities to preserve or create high-value wildlife habitat. The Greenways corridors have the potential to be used as a "wetlands bank", within which existing wetlands are enhanced, or new wetlands are created, to compensate for wetlands losses due to developments in other parts of the city. Wetlands banking within the Greenways corridors would create the opportunity for wetlands enhancement and creation with funding from outside the city.

Water Quality

As part of the Master Plan update process, opportunities to improve water quality in Boulder Creek and its tributaries have been identified. Base flows will be maintained in stream channels as opposed to being entirely intercepted by irrigation ditches and other users wherever possible.

The *South Boulder Creek Inventory* prepared by the Open Space Department has identified instream flow goals for South Boulder Creek from Gross Reservoir to its confluence with Boulder Creek. Achieving minimum stream flow protection will involve a coordinated effort among the major South Boulder Creek water diverters.

The Public Works Department has completed the Boulder Creek Watershed Study, which includes a water quality assessment tool combining water quality, aquatic habitat, and land-use data to characterize each sub-basin and help support management decisions (e.g. stream restoration opportunities, land-use controls). Products of the Watershed Study include a water quality database, GIS mapping of water resources, sub-basins classification and prioritization based on resource needs, characterization of pollutant loadings and impacts, and a implementation plan for pollution control, habitat mitigation and restoration.

Urban Forest

The original *Tributary Greenways Master Plan* recognized the need for sustained vegetation management

and planting to maintain and enhance the ecology of each stream. Trees lost to age and storms will need to be replaced. Vegetation along banks and in sensitive areas may need increased maintenance as the use of these areas increases. Thinning may be necessary to preserve diversity.
The Urban Forestry Program provides planting, care and maintenance and removal for city-owned trees on street rights-of-way and within city parks. The Forestry staff currently provides full service maintenance for over 40,000 trees within the city.

Trees located on city-owned lands within the Greenways corridors should receive routine inspection for the purposes of diagnosing problems and controlling disease. Consultation with Forestry staff concerning path and landscape design may prevent tree damage as a result of Greenways project construction and facilitate the development of healthy, sustaining forest communities within the corridors. Current funding of Urban Forestry is inadequate to achieve these goals within the Greenways corridors. Tree maintenance is discussed further in Chapter VIII.

Transportation and Recreation

The *Greenways Master Plan Update Survey* (1997) provides information on the public perception of the nature and extent of current and future Greenways bike and pedestrian path use and recreational use. This survey indicates:

- Almost half of the surveyed households reported using the trail system 26 or more times in the last 12 months. Only 10 percent of the households did not use the Greenways paths within the last 12 months.
- The most common activities performed on the trails were biking and walking.
- Almost half of the respondents rated the number of people using the system as "about right"; 28 percent felt there were too few people using the system, and 16 percent felt there were too many users.
- When asked what could be done to increase the use of the Greenways trails, the most common response was to increase the number of trails, access points and connections.
- Survey respondents overwhelmingly (79%) preferred off-street to on-street bike lanes. After hearing information on the advantages and disadvantages of each (including environmental effects), about 64 percent suggested that the city pursue off-street bike paths as compared to their on-street counterparts.
- When respondents were asked to rate how well each of the Greenways goals are being met, the provision of recreation opportunities was judged to be the best met goal, even though environmental preservation was judged to be the most important goal.

The target of the *Transportation Master Plan Update for the Boulder Valley* (July 1996) is to shift 15 percent of all daily trips currently made by single-occupant autos to other forms of transportation. The *Bicycle System Plan* (June 1996) specifically calls for an increase in the bicycle mode share that translates into doubling the total number of bicycle trips from 80,000 per year in 1994 to 160,000 per year in 2020.

The original Greenways Master Plan acknowledges that trails and bikeways are an important planning

consideration that may be accommodated in or near the creek corridor, when balanced with the other goals for the program.

Safety

The Greenways system is considered by the public to be a relatively safe environment. Respondents to the *Greenways Master Plan Update Survey* (1997) felt relatively free from harassment (81 on a 100-point scale), crime (77 on a 100-point scale) and collisions (65 on a 100-point scale). While on average, respondents felt safe from harassment and crime, there was less of a sense of security from collisions.

The Boulder Police Department records indicate a total of 26 crimes specifically identified with bike or creek paths from January 1, 1997 through April 30, 1999. The majority of the reported incidents occurred along the Boulder Creek Corridor.

The Boulder Police Department has made the following suggestions to ensure continued safety of the Greenways system:

- Adequate lighting of future Greenways trails should be provided.
- "Unfriendly" vegetation (e.g., thorny bushes, vegetation too thick to provide human access; vegetation designed so that it does not provide hiding places, etc.) should be used near paths and bike ways.
- 911 access telephones should be provided at convenient intervals along all trails.

Where collision hazard is high, installation of parallel soft-surface trails, when in keeping with environmental goals and objectives, may reduce pedestrian conflicts with bicyclists and roller bladers. Adherence to the design guidelines whenever possible will reduce the incidence of unsafe curves, grades, and headroom on paths and trails.

Flood Mitigation

It is one of the basic goals of the Greenways Program to integrate floodplain management techniques which preserve open space, protect existing vegetation, wetland and wildlife habitat, and which provide for contact between surface and ground water. In addition, it is city policy that the flood carrying capacity of the creeks will not be reduced and, as a part of drainageway master plans, may be increased.

The city's Storm Water and Flood Management Utility (also referred to as the flood control utility) is empowered to purchase interests, including ownership and easements, in land that may be necessary to protect the public health, safety and welfare from damage from storm water runoff and floods. The pre-flood property acquisition program provides funding to acquire property within the high hazard zone. These properties typically coincide with areas suitable for use in riparian habitat preservation or restoration, trail, park and water quality improvement projects. This provides opportunities to leverage property acquisition resources for these multiple purposes. Where property acquisition is not necessary for the purposes of flood hazard mitigation, easements are needed for normal drainage of water and associated drainage maintenance. Easement acquisition costs can be leveraged among the various Greenways Program

objectives.

The flood utility requires access trails suitable for heavy equipment along the drainages in order to adequately maintain the drainages. This situation provides opportunities to leverage the need for maintenance access with public transportation needs along the Greenways corridors.

The city's flood utility works in cooperation with the Urban Drainage and Flood Control District (UDFCD) to increase public safety and the protection of property within the flood hazard zone. Three master planning efforts, involving Fourmile Canyon Creek, South Boulder Creek, and Wonderland Creek from 28th Street to Foothills Parkway, are in progress. The UDFCD is involved in multiple maintenance projects within the city. The UDFCD is a major source of funding for flood mitigation projects, which may also represent other Greenways project objectives, within the city. Cooperation with UDFCD in the areas of maser planning, design and construction, and maintenance will continue throughout the period reflected in this Master Plan. Funding for projects within the drainages currently eligible for UDFCD project support will continue to be actively pursued.

Historic and Cultural Resources

Historic and cultural resources help define the aesthetic and cultural qualities of the Greenways corridors. The Greenways system should respect the character of existing and historic land uses, public gathering locations, historic sites and other cultural resources along the Greenways corridors. When designing trails, flood mitigation measures, or other projects along the Greenways, the city should identify, document, and seek to protect any historic or cultural resources that may be disturbed by construction. The city should promote its historic and cultural resources throughout the Greenways system by improving access and providing signage and other educational devices.

Boulder's early settlers and Native American populations used the area's creeks, streams, and tributaries to help determine transportation routes and settlement patterns. The Greenways system therefore contains some of Boulder's oldest and most valuable historic resources. The city, through its Historic Building Inventory Record, has identified and documented many historic buildings and sites along the Greenways corridors. Histories of the Silver Lake, Anderson and Farmers Ditches have been published. However, relatively little has been done to identify, document and preserve Boulder's archaeological and cultural heritage.

The city recognizes and protects historic resources under Title 10, Section 13 of the Boulder Revised Code. Historic resources are defined as buildings, structures, sites, or areas of historical, architectural, and/or environmental significance to the city of Boulder. Historic resources generally fall into one or more of the following categories:

- Sites or structures recognized by the city as individual landmarks
- Sites or structures that contribute to locally designated historic districts
- Sites or structures that contribute to potential local historic districts
- Sites or structures deemed eligible for local landmarking

At the present time, there are six local historic districts and more than 110 individual historic landmarks within the city. In addition, the city has identified several potential historic districts and completed surveys of potentially significant historic resources throughout many of the older neighborhoods.

The existing Greenways system contains one individual landmark, the Boyd Smelter Site, and several sites and structures that are considered eligible for local landmarking. In addition, the Boulder Creek Corridor passes through the potential Highland Lawn historic district. Drainages added to the Greenways system in the future may pass through other potential historic districts.

The city should continue to identify and document historic sites and structures along the Greenways corridors. In addition, the city should expand its Historic Building Inventory Record to identify and document potentially significant archaeological and historic resources associated with the Greenways corridors.

The city has consulted with Historic Boulder, Inc. to help define Greenways system locations with associated known cultural resources. In addition, Historic Boulder, Inc. has designated areas in which special design considerations may be appropriate to preserve the historic character of neighborhoods. In conjunction with the Master Plan update, a cultural resource inventory of the Greenways corridors was completed. A summary of the inventory findings is contained in Appendix III-1 of this plan.

H. Program Evaluation

Upon completion, the Boulder Creek path was widely recognized as an attractive and innovative method of enhancing the urban environment while addressing the multiple objectives of flood hazard mitigation, alternative transportation, recreation, water quality protection and riparian environment preservation and enhancement. This project has won numerous national awards, including the American Rivers Symposium Trailblazer award in 1995 and the Trail Town USA award from the American Hiking Society in 1996.

The development of the Greenways system, based on the success of the Boulder Creek Corridor project, similarly became a model of economic, aesthetic and cultural success. The program continues to attract national and international attention. The Greenways Coordinator frequently receives calls for information on the program from urban planners around the country and the world.

Greenways Master Plan Update Survey

The *Greenways Master Plan Update Survey* conducted by the National Research Center in 1997, provides an evaluation of the overall Greenways Program from the perspective of those who use it, the citizens of Boulder. Based on a randomly selected, representative sample of Boulder households interviewed by telephone (approximately 400 completed surveys), public perceptions of the successes of the Greenways Program are:

- All of the goals of the program are perceived as important. Respondents rated the goal of environmental preservation as the most important goal, followed by flood protection, transportation

and recreation.

- In terms of how well each of these goals is being met, the respondents thought that recreation was the best met goal. Flood hazard protection was rated lowest.
- Almost half of the households surveyed reported using the Greenways trails system 26 or more times during the preceding 12 months.
- About half of the respondents reported that the number of people using the system was "about right".
- System users rated connections to recreation centers or the workplace and school of adult household members best in terms of system connectivity.
- About 60 percent of the respondents supported the city pursuing construction of new paths.
- When informed that the Greenways system was about 50 percent complete and that the current city goal was to complete the system within 15 to 20 years, 46 percent of the respondents felt the proposed time frame was just about right.
- Sales tax was the preferred method of funding acceleration of the Greenways Program by 44 percent of respondents (regardless of their opinion on whether or not this acceleration should occur).
- About half of those surveyed supported expansion of the Greenways system to connect to every major school, park, employment center and neighborhood for pedestrians and bicyclists without impacting any existing creek corridor.
- About 64 percent of the respondents felt the city should emphasize off-street bike paths as opposed to their on-street counterparts.

Negative perceptions of the program were few. However, certain findings identified issues which were addressed through the Master Plan update process:

- A majority of the respondents (62 percent) reported they had not heard of the Greenways Program.
- The importance of the environmental goal was significantly greater than the recreation goal, yet residents felt the recreation goal was better met than the environmental goal.
- Regarding public use of the system, 28 percent of the respondents felt too few people were using the system, and 16 percent said too many people are using the system.
- When rating connectivity to destinations, connections to other cities in Boulder County were rated lowest.
- On average, users reported a perception of safety from harassment and crime on the system trails; however, there was less of a sense of security from collisions.
- When the positive and negative aspects of new path construction were presented, including potential damage to open areas, unique ecosystems and endangered species, almost one quarter of the respondents opposed the construction of new paths and trails, and 17 percent were undecided.

- If acceleration of program completion** to the next five years would cost $1.5 to $2 million more per year than is currently budgeted, almost half of those opposed acceleration of the plan.
- When presented with the advantages and disadvantages, including impacts to the natural environment, of off-street bike paths, 21 percent responded that on-street bike lanes should be emphasized.

Internal Greenways Program Evaluation

The city conducted a staff debriefing on the Greenways Program on December 8, 1998. The meeting included representatives from Transportation, Utilities, Planning, Public Works Administration, the City Attorney's Office, Development and Inspection Services, Facility and Asset Management, Open Space, Streets and Bikeways Maintenance, Public Works Administration, Parks and Recreation, and Water Quality. Staff perceptions of the successes of the Greenways Program included:

Overall Program

- The opportunistic approach of the program is successful.
- The program has accomplished a lot - 50 percent of the system is complete, and 80 percent of the proposed trails have been completed***.
- The Greenways system is a safe, wonderful, recreational system.
- The Greenways system is popular with citizens.
- The Greenways system has promoted a renewed appreciation for the creeks.
- Conflicts between flood and environmental issues within the riparian corridors were resolved.
- The program has provided a model for other communities, locally and nationally.
- Public awareness of the need for water quality enhancement has been raised.
- The program has resulted in the enhancement of urban open space.
- The program has represented multiple purposes and objectives as outlined in the original master plan.
- There is a perception that the Greenways system is an enhancement of the city.

Program Organization and Implementation

- Having a central point of contact for the program has been helpful.
- The team approach to the projects has been successful.

Funding

- The program has done a good job of leveraging non-city financial resources.
- The program has been successful in streamlining multi-departmental funding.
- The program has facilitated private sector cooperation.

** Questions concerning the acceleration of program completion pertained to the projects identified in the previous master plan.

*** This statement pertains to projects identified in the previous master plan.

- Justification and accounting for funding from multiple sources has been done well.

Project Design, Construction and Maintenance

- Multiple purposes were evaluated during the design and construction of projects.
- Continuing maintenance of projects was facilitated because the right people were included in the design phase.
- The projects have been well-managed and the construction has been well done.
- The projects have had high quality, aesthetically pleasing designs.
- Project designs incorporate water quality enhancement measures.
- The design process allows for on-going adjustments during a project.
- The projects have been well-maintained.
- The project designs have included good access for maintenance purposes.

Staff perceptions of areas within the Greenways Program which could be improved were used in the development of issues to be addressed in the master plan update process. These issues include:

Overall Program

- Creek sides and underpasses are subject to flooding.
- Nomenclature and terminology (e.g., greenways, bike path, flood channel) should be consistently defined and used.
- Better balance is needed between environmental and transportation concerns.
- Environmental objectives have not been a priority.
- There have been interdepartmental struggles over such things as wetlands projects, CEAPs, and maintenance.
- Improvement is needed in interdepartmental staff communication.
- Seven drainages within the city are not included in the plan. Environmental preservation and balance among objectives are needed in these areas too.

Program Organization and Implementation

- Inter-departmental involvement is not always a smooth process.
- Responsibility within the program is not always clear to the staff or the public.
- CEAPs should be more comprehensive, instead of being incrementally prepared for each project.
- There is a lack of clarity and consistency in program direction.
- The project permitting and approval processes are complicated. It is not always apparent when and if certain permits or approvals are required.

Funding

- As projects are completed, there hasn't been new funding for maintenance purposes.

Project Design, Construction and Maintenance

- Maintenance responsibilities are fragmented, leading to confusion over who is responsible for what.
- Responsibilities for installation and maintenance of trees need to be clarified.
- Some projects were not constructed according to plan/design.

- National safety guidelines (e.g., headroom, curves and grades on paths) have not always been met.
- Project designs sometimes do not take maintenance access into consideration.
- The 26th to 28th Street segment of Goose Creek may or may not have been completed according to the established design guidelines.

Based on the survey, the 12/8/98 debrief and the various public meetings held during 1998 to 2000, staff identified a series of high level actions needed within the Greenways Program. Measures which have been taken to address these action items in the process of the master plan update are summarized below:

- A system-wide environmental analysis with mapping has been completed.
- Environmental enhancements within the Greenways system should be highlighted.
- A list of environmental enhancement projects has been compiled.
- Priority for environmental objectives and funding mechanisms for environmental enhancement projects have been developed.
- A comprehensive maintenance plan has been identified.
- The possibility of a dedicated maintenance group for Greenways was explored.
- Consistent, defined terminology and nomenclature has been developed.
- The organizational structure for running the Greenways Program was defined.
- Use of the Greenways corridors for a wetlands mitigation bank, in which wetlands can be created enhanced to compensate for wetland impacts in other parts of the city, will continue to be explored.

TABLE II-3
TRIBUTARY GREENWAYS INVENTORY OF EXISTING CONDITIONS

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
Boulder Creek (BC7)	Fourmile Canyon to Eben Fine	BC02-06	✔	✔				✔		F-G*	G-VG	G-VG	P-VG		✔	✔	✔	✔			
(BC7)	Eben Fine to 6th St.	BC09	✔	✔				✔		F	P	VG	P		✔	✔					
(BC7)	White Water Course	BC03								F	VG	VG	P			✔					
(BC7)	Boyd Smelter Site	BC09								F	P	VG	P					✔			

* Habitat Rankings: VP=Very Poor; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent.

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
(BC7)	6th Crossing	BC09					✔			F	P	VG	P								✔
Boulder Cr. cont. (BC7)	6th to 9th	BC12	✔	✔				✔		G	P	VG	VP			✔	✔				
(BC7)	Sculpture Garden	BC12								G	P	VG	VP			✔				✔	
(BC7)	9th Crossing	BC12/15**					✔			F-G	P-G	G-VG	VP-G								✔
(BC7)	9th to Broadway	BC15-17	✔					✔		F	P-G	G	P-G		✔	✔					
(BC7)	Broadway Crossing	BC17					✔			F	P	G	P								✔
(BC7)	Broadway Bridge	BC17								F	P	G	P							✔	
(BC7)	13th/Arapahoe Rest Area	BC17								F	P	G	P	✔	✔						

** These designations refer to the approximate boundary between reaches.

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(BC7)	Arapahoe Crossing	BC17					✔		✔	F	P	G	P								
Boulder Cr. cont.	(BC7&BC6)	Broadway to 17th	BC17-22	✔					✔		F-G	P-G	G-VG	P	✔		✔					✔
	(BC6)	17th St. Bridge	BC22								G	P	VG	P							✔	
	(BC7)	Farmers' Market	BC17								F	P	G	p							✔	
	(BC7)	Dushanbe Teahouse	BC17								F	P	G	P							✔	
	(BC7&BC6)	Boulder High School	BC19-22								F-G	P-G	G-VG	P							✔	
	(BC6)	17th to Folsom	BC22-28	✔					✔		F-G	VP-G	P-VG	P	✔							✔
	(BC6/BC5)	Folsom Crossing	BC30					✔			F	VP	G									
	(BC5)	Folsom to 28th	BC30-32	✔					✔		F	VP-P	G			✔				✔		✔
	(BC5)	28th Crossing	BC32					✔			F	P	G									

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(BC5)	28th to 30th	BC32-34	✔					✔		F	P	G			✔	✔				✔	✔
Boulder Cr., cont.	(BC5/BC4)	30th Crossing	BC37					✔			G	VP	VG									
	(BC4)	30th to Arapahoe	BC37-42	✔							F-G	VP	VG									
	(BC4/BC3)	Arapahoe Crossing	BC42					✔			F	VP	VG									
	(BC3)	Arapahoe to Foothills	BC45	✔	✔				✔		F	VP	G									
	(BC3/BC2)	Foothills Crossing	BC47					✔			G	P	G									✔
	(BC2)	Foothills to Goose	BC47-50	✔							F-G	P-G	G		✔	✔						
	(BC1)	Goose to 55th	BC51	✔					✔	✔	G	P	VG		✔							
	(BC1)	55th Crossing						✔														
	(BC1)	Pearl Parkway Bridge						✔	✔													

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(BC1)	Pearl Parkway Crossing						✔														
Fourmile Creek	(FC5)	West of Broadway	FC01	✔					✔		F	VG	P	P							✔	
	(FC5)	Broadway Crossing	FC03					✔	✔		F	G	G	P							✔	
	(FC5&FC4)	Broadway to Violet	FC03-05						✔		F	P-G	G-VG	P-G								
	(FC4)	Violet Crossing	FC05						✔		F	P	VG	G								
	(FC4)	Violet to 19th	FC05-07						✔		F	P-G	VG	P-G								
	(FC4/FC3)	19th Crossing	FC07						✔		F	G	VG	P								
	(FC3)	19th to 26th	FC07-12						✔		F	VP-G	G-VG	P-G							✔	
	(FC3)	Tamarack to Riverside	FC11	✔					✔		F	P	G									
	(FC3)	26th Crossing	FC12						✔		F	VP	G									

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(FC3)	26th to 28th	FC12-14						✔		F	VP-P	G				✔					
	(FC3/FC2)	28th Crossing	FC14					✔			F	P	G									
Fourmile Cr., cont.	(FC2)	28th to 30th	FC14-15	✔					✔		F	P-G	G									
	(FC2)	30th Crossing	FC15					✔			F	G	G									
	(FC2&FC1)	30th to 47th	FC15-16	✔						✔	F	P-G	G			✔	✔					
	(FC2/FC1)	47th Crossing	FC16					✔		✔	F	P	G									
	(FC1)	47th to Diagonal	FC16	✔						✔	F	P	G									
	(FC1)	Diagonal Southbound Crossing						✔														
	(FC1)	Diagonal Northbound Crossing						✔														
	(FC1)	Diagonal to RR																				

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(FC1)	RR Crossing																				
Wonderland Creek	(WC8)	West of Broadway	WC01	✔	✔						G	P	G	P			✔				✔	
	(WC8/WC7)	Broadway Crossing	WC01	✔				✔			G	P	G	P								
Wonderland Cr., cont.	(WC7&WC6)	Broadway to 19th	WC01-03							✔	F-G	P-G	P-G	P-G								
	(WC7/WC6)	15th Crossing	WC01/02				✔				F-G	P	G	P-G								
	(WC6&WC5)	19th to 26th	WC03-06							✔	F	G	P-G	P-G							✔	✔
	(WC5/WC4)	26th Crossing	WC06				✔				F	G	G	G							✔	
	(WC4)	26th to 28th	WC06-08	✔							P-F	G	VP-G	G							✔	
	(WC4/WC3)	28th Crossing	WC08				✔		✔													
	(WC3)	28th to Kalmia	WC08-09	✔							P	P	G	P								

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(WC3)	Paseo del Prado Crossing	WC09								P	P	G	P								
	(WC3)	Kalmia Crossing	WC09				✔				P	P	G	P								
	(WC3)	Kalmia to Diagonal	WC09-10	✔					✔		P-F	P	G	P								
Wonderland Cr., cont.	(WC3)	Diagonal to Foothills	WC10-13						✔		P-F	P-E	P-VG	VP-P								
	(WC3)	Iris Crossing	WC11						✔		P	G	G	VP								
	(WC3)	34th Crossing	WC11						✔		P	G	G	VP								
	(WC3/WC2)	RR Crossing	WC13							✔	P	E	P	P								
	(WC2)	Foothills Crossing	WC13							✔	P	E	P	P								
	(WC2)	47th Crossing	WC13								P	E	P	P								
	(WC2)	Foothills to Valmont	WC13-15	✔							P	VG-E	P-G	VP-P			✔					

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(WC2)	Kings Ridge Crossing	WC15				✔				P	VG	P	VP								
	(WC2/WC1)	Valmont Crossing	WC15					✔			P	VG	P	VP								
	(WC1)	Valmont to No. Goose	WC15-16	✔					✔		P	P-VG	P	VP-P		✔	✔					
Goose Creek	(GC6)	19th to Folsom	GC01-04	✔					✔	✔	P-F	VP-P	P-VG	P-G								
Goose Cr., cont	(GC6/GC5)	Folsom Crossing	GC04								F	P	VG	P								
	(GC5)	Folsom to 28th	GC04-05						✔		F	P	VG	P							✔	
	(GC5/GC4)	28th Crossing	GC05					✔														
	(GC4)	28th to 30th	GC07	✔							F	P	VP	G			✔					
	(GC4)	30th Crossing	GC07					✔			F	P	VP	G								
	(GC4&GC3)	30th to Foothills	GC07-13	✔							P-F	P-E	VP-VG	G							✔	

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(GC4/GC3)	RR Crossing	GC13					✔			P	P	VP								✔	
	(GC3/GC1)	Foothills Crossing	GC13								P	P	VP									
North Goose	(GC1)	Foothills to Wonderland		✔													✔					
	(GC1)	Wonderland to Boulder Creek		✔																		
North Goose, cont.	(GC1)	Pearl Parkway Crossing						✔														
South Goose	(GC2)	Foothills to Boulder Creek	GC13-16	✔							P	P-VG	VP									
	(GC2)	Foothills Crossing						✔														
	(GC2)	48th Crossing	GC14				✔				P	VG	VP									
	(GC2)	Rest Area	GC14								P	VG	VP		✔	✔						
Elmers Twomile Creek (ET1)		26th to Iris	ET02								P	VP	P	P								

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
(ET1)	26th Crossing	ET02								P	VP	P	P								
(ET1)	Iris Crossing	ET02							✔	P	VP	P	P								
(ET1)	Iris to Glenwood	ET02-04	✔							P	VP-P	VP-G	P			✔					
(ET1)	Glenwood Crossing	ET04						✔		P	VP	G	P								
Elmers Twomile Cr. cont(ET1)	Glenwood to Valmont	ET04-05						✔		P	VP-G	G	P								
(ET1)	Valmont Crossing	ET05								P	G	G	P								
.(ET1)	Valmont to Goose	ET05						✔		P	G	G	P								
Skunk Creek (SC5)	Hollyberry to NOAA	SC01-04	✔							F	VP-E	P-VG	P-E							✔	
(SC5)	NOAA to Broadway	SC06	✔							F	VP	G	P								
(SC5/SC4)	Broadway Crossing	SC06					✔			F	VP	G	P								

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(SC4)	27th Crossing	SC07								F	P	VG	P								
	(SC4)	Moorhead Crossing	SC07								F	P	VG	P								
	(SC4/SC3)	Highway 36 Crossing	SC07					✔			F	P	VG	P								
	(SC4/SC3)	Moorhead to Baseline	SC07	✔							F	P	VG	P								
	(SC3)	Baseline Crossing	SC07/08					✔			P-F	VP-P	VG	VP-P								
Skunk Creek, cont.	(SC3)	29th Crossing	SC08								P	VP	VG	VP								
	(SC3)	Baseline to 30th St.	SC08-10								P-F	VP-P	G-VG	VP-G								
	(SC3)	28th Street On-ramp Crossing	SC07/08					✔			P-F	VP-P	VG	VP-P								
	(SC3&SC2)	30th to Colorado	SC10-12								F	P	G-VG	G-VG								
	(SC3)	30th Crossing	SC10								F	P	G	G								

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
(SC3)	Aurora Crossing	SC12								F	P	VG	VG								
(SC2)	Colorado Crossing	SC16					✔			F	VG	G									
(SC2/SC1)	Colorado to Research Park	SC16-19	✔							F	P-E	P-G								✔	✔
(SC2)	Discovery Crossing	SC18					✔			F	E	P									
(SC1)	Boulder Creek Rest Area	BC42								F	VP	VG		✔							
Bear Creek (BCC6)	Mountains to Lehigh	BRC01-06								F-G	P-E	P-VG	P-G								
(BCC5/BCC4)	Lehigh to Broadway	BRC06-11								F	P	P	VP-G								
(BCC4)	Broadway Crossing	BRC11/12					✔			F	P-G	P-G	P-G								
(BCC4)	Broadway to Martin	BRC12-16	✔							F	P-G	G	VP-P		✔	✔					
(BCC4)	Martin Crossing	BRC16					✔														

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH		GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
				Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
	(BCC4/BCC3)	Martin to Moorhead	BRC16	✔																		
	(BCC3)	Moorhead Crossing	BRC16/18					✔			F	P	VG	G								
	(BCC3)	Moorhead to Highway 36	BRC18	✔							F	P	VG	G								
	(BCC3)	Highway 36 Crossing	BRC18					✔			F	P	VG	G								
	(BCC3)	Highway 36 to Baseline	BRC18-22	✔							F	P-G	VG	G								✔
Bear Creek, cont.	(BCC3/BCC2)	Baseline Crossing	BRC22					✔			F	G	VG									
	(BCC2)	Baseline to Gilpin	BRC22-24	✔					✔		F	G	G-VG				✔					
	(BCC2)	Gilpin Crossing	BRC24					✔	✔		F	G	G									
	(BCC2)	Gilpin to Mohawk	BRC24-27	✔					✔		F	P-G	G				✔					
	(BCC2)	Mohawk Crossing	BRC27					✔	✔		F	P	G									

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
(BCC2)	Mohawk to Colorado	BRC27-29	✔							F	VP-P	G				✔					
(BCC1)	Foothills Crossing	BRC29					✔			F	VP	G								✔	
(BCC1)	Colorado to Arapahoe	BRC30-32	✔							F	P	G								✔	✔
(BCC1)	Arapahoe to Boulder Creek		✔																		
(BCC1)	Arapahoe Crossing																				

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
South Boulder Creek	Broadway to Highway 36			✔																✔	
	Highway 36 to South Boulder Road			✔																✔	
	Highway 36 Crossing						✔													✔	
(SBC4)	South Boulder Rd. Crossing						✔														
(SBC4)	South Boulder Rd. to Baseline	SBC00-08	✔	✔						F-G	VG-E	G-VG	G-VG		✔	✔					
(SBC4/SBC3)	Baseline Crossing	SBC08/09					✔			G	VG	G-VG	VG								
.(SBC3)	Baseline to Wellman Canal	SBC09-13	✔							G	P-VG	G	G-VG			✔				✔	
(SBC3)	Wellman Canal to Arapahoe	SBC13-19								F-G	VP-G	G-VG	G							✔	
(SBC3 /SBC2)	Arapahoe Crossing	SBC19					✔			F	G	VG									
(SBC2)	Arapahoe to Stazio	SBC19-2.1	✔					✔	✔	F	G	P-VG				✔				✔	

TRIBUTARY GREENWAYS MASTER PLAN MAP AND INVENTORY REACH	GEOGRAPHICAL DESCRIPTION	ENV. ASSESS-MENT REACH	TRAIL					FLOOD MITIGA-TION		AQUA-TIC HABITAT	TERRES-TRIAL HABITAT			PASSIVE RECREATION			CULTURAL/ HISTORIC RESOURCES				
			Paved	Unpaved	None	At-Grade Crossing	Grade-Separated Crossing	Flood Hazard Mitigation	Minor Drainage Improvement		Native Plant Habitat	Vegetative Structure	Bird Species Richness	Rest Stop	Drinking Fountain	Connection to Park	Landmark/Site Eligible for Landmarking	Existing Historic District	Potential Historic District	Other Cultural/Historic Resource	Connection to Urban Center
So. Boulder Creek, cont(SBC2)	RR Crossing	SBC1.1					✔			F	G	P								✔	
(SBC2)	Stazio to Central	SBC2.1-3.1	✔							F	G-VG	G				✔				✔	
(SBC2)	Stazio Connection	SBC2.1/3.1	✔							F	G-VG	G			✔						
(SBC1)	Valmont Crossing	SBC3.1/4.1	✔				✔			F	VG	G									

III. Plan Development

A. Introduction

A public meeting was held in September 1998 to develop an approach for public involvement in the Master Plan update process. It was the group consensus that the process would involve numerous opportunities for public comment on a city staff written Plan. A core group of staff, representing multiple city divisions and departments was assembled to evaluate issues and participate in the development of the Greenways Master Plan update.

All owners of property adjacent to Greenways were notified by direct mailing of all Greenways Master Plan public meetings. Public notices were also placed in the Daily Camera, on the Greenways web site and on signs along the Greenways.

An implementation plan for the Master Plan update was developed based on the input received in the public meeting and the core staff group's understanding of the purpose and components of a master plan. This implementation plan was distributed in November 1998 to City Council, the five boards involved with Greenways and other interested parties. The Master Plan Implementation Plan was intended to be dynamic in order to allow for and incorporate public comment into the process.

The Implementation Plan was divided into three phases. Phase I included an evaluation of the program to date and historical information about the program. During Phase II, projects and opportunities for each of the Program's objectives were developed. The final phase of the Master Plan update included reaching consensus on the following issues:

- the development of prcedures and processes for project planning and public involvement;
- an organizational structure;
- a financing plan, and;
- a maintenance strategy.

The Phase I draft report was distributed to the board members, City Council and interested members of the public on June 8, 1999, in conjunction with a Greenways Open House. Over 100 people attended the Open House. In addition to providing information about the Greenways Master Plan update, the Open House was also intended to provide general information and to solicit comments about the Program.

Several other Greenways forums were held over the summer of 1999 to solicit public input. The Circle Boulder by Bicycle ride/run was held in June. This event provided an opportunity for citizens to become familiar with the Greenways corridors. Three additional bicycle rides were held in September, which were intended to inform citizens about upcoming projects along the Greenways corridors, as well as solicit comments from the public. In August a staff bicycle ride was held for the purpose of evaluating past projects and identifying what worked well and what did not. A Greenways web site was established in May to provide a better informational link and can be found at www.ci.boulder.co.us under Services and Departments.

In order to complete the second phase of the Master Plan, a Greenways Riparian Habitat Assessment as performed during the summer of 1999 to fill the data gaps in the city's environmental information. A public presentation of the results of the study was held on Oct. 23, 1999. This study represents a comprehensive evaluation of the quality of the riparian habitat along the 13 creeks that run through the city of Boulder. The methodology was designed to specifically compare the quality of riparian ecosystems within an urban environment and assesses both existing habitat quality as well as restoration potential. This data was utilized to identify areas along the Greenways corridors for restoration, protection and management.

B. Baseline Studies

Environmental Evaluation

The current status of terrestrial habitat within the drainages included in the Greenways Program was assessed and mapped in 1999 ("*Greenways Riparian Habitat Assessment*," October 23, 1999). This assessment included a rating of the existing vegetation structure, native plant habitat, and bird habitat for all stream reaches within the city of Boulder. The terrestrial habitat inventory provides the baseline against which future Greenways projects may be evaluated and has identified opportunities for preservation of high quality habitat and habitat restoration throughout the Greenways system.

The city has also evaluated aquatic habitat in the stream reaches included in the Greenways Program. Data are available concerning existing conditions for primary (streambed), secondary (channel morphology) and tertiary (bank stability) aquatic habitat characteristics, as well as vegetative bank stability ("*City of Boulder Aquatic Habitat Assessment,"* 1995). These data have been used to identify opportunities for aquatic habitat preservation and enhancement through Greenways projects.

The city's storm water program was developed in order to address the impacts of urbanization upon water quality and riparian habitat, including increases in pollutant quantity and runoff amount and rate; increases in stream sediment loading and temperatures; and degraded stream habitat and wetlands.

In the past, federal regulations focused on controlling and permitting discharges from point sources such as wastewater treatment plants and industrial discharges. In recent years, the EPA has expanded its discharge permit system to include discharges from storm sewer systems. This expansion of the permit system is directed by the Storm Water Quality regulations promulgated under the Federal Clean Water Act in 1990 and takes a two-tiered approach. Phase I of these regulations required urbanized areas with populations greater than 100,000 to permit their storm sewer systems. Regulations for Phase II were finalized in November 1999 and will require urbanized areas with greater than 50,000 population to permit their storm sewer discharge systems.

Regionally, the city, Boulder County and Longmont are automatically subject to the Phase II regulations. Louisville and Lafayette are identified as potentially subject to these permitting requirements, pending the results of the 2000 Census. The city's permit application would be due at the end of December 2002. Storm water quality permits will be administered by the Colorado Department of Public Health and Environment, under the Colorado Discharge Permit System.

Traditionally, discharge permit compliance has been based on water quality monitoring of discharges and receiving waters to confirm that a discharge is meeting numeric targets. Rather than numeric limits, compliance with the Phase II storm water quality regulations focuses on the implementation of procedures and programs, application of water quality protection techniques and documentation of these activities. Specifically, the Phase II Storm Water Quality regulations require the implementation of the following six programs:

- **Public education/outreach:** Implement a public education program to provide information on storm water impacts.
- **Public involvement/participation:** Provide opportunities for the public to participate in program development and implementation.
- **Illicit discharge detection and elimination:** Prohibit illicit discharges to storm sewer system.
- **Construction site storm water runoff control:** Implement a program to reduce pollution from construction site runoff for sites larger than 1 acre in size.
- **Post-construction storm water management in new development and redevelopment:** Implement a program to reduce runoff pollution from new development and redevelopment.
- **Pollution prevention/ good housekeeping for municipal operations:** Implement operation/maintenance/training programs to prevent or reduce runoff pollution from municipal operations.

The city's compliance strategy will include an analysis of local needs, goals and existing control systems. Options will be developed to address gaps in the regulations, standards and programs. Community input will be used to identify and evaluate these options. Additionally, the city will look to share resources with other jurisdictions in the watershed and between city departments. Educational efforts will work with other ongoing efforts such as the League of Women Voters and the state's non-point source programs. The resulting implementation plan will provide direction for the permit application.

The city recognizes the importance of watershed protection as expressed in numerous resolutions passed by the City Council and advisory boards and by its adoption of watershed and water quality protection provisions in the Boulder Valley Comprehensive Plan. A watershed approach to compliance with the Phase II regulations offers the opportunity to leverage existing local resources to create a more comprehensive and effective process for water quality protection. In accordance with these policies, the city has begun discussions with Boulder County to identify appropriate areas of coordination. A task force began meeting in 1998 to explore the practicalities of a joint program.

Cultural Resources Inventory

The city conducted a cultural resource inventory of the following eight corridors within the Greenways system:

- Fourmile Canyon Creek (Foothills Community Park to the Diagonal Highway)
- Wonderland Creek (Wonderland Lake to Valmont Park)
- Elmer's Twomile Creek (Parkside Park to Goose Creek confluence)
- Goose Creek (23rd Street to Valmont Park)
- Boulder Creek (Eben Fine Park to 55th Street)
- Skunk Creek (Holly Berry to C.U. Research Park
- Bear Creek (Lehigh Street to Boulder Creek confluence)
- South Boulder Creek (Baseline Road to Valmont Lake)

The objectives of the study were to locate and document all visible prehistoric and historic cultural resources within these Greenways corridors and to assess their significance so that appropriate management decisions may be made regarding their protection and interpretation and to produce a comprehensive inventory of cultural properties in the Greenways corridors, pulling together information from a variety of research sources and the field investigations.
Significance of cultural properties is defined in terms of meeting specific criteria of eligibility for nomination to the National Register of Historic Places (NRHP), the State Register of Historic Properties (SRHP) or for local landmarking. The various eligibility criteria and the results of the inventory are summarized in Appendix III-1.

Cultural site information is included in the Reach Inventory, Projects and Opportunities presented in Chapter VII. The cultural resource inventory has identified opportunities for preservation of significant cultural resources throughout the Greenways system. Cultural properties by definition achieve historic status at 50 years of age. Future cultural resource inventory updates will be needed to record and assess the significance of additional properties as they achieve historic status.

C. Program Goals and Criteria

Program goals were developed by the interdisciplinary staff work group based upon the goals, objectives and policies from related master planning efforts, current federal, state and local regulations, standards and criteria, and public comment obtained through a series of public meetings convened in the course of updating this master plan. Quantifiable criteria for measuring program success at achieving the goals have also been developed. Ideally, these criteria would be evaluated for each Greenways project at the design stage and again at project completion. An overview of Greenways Program success could be developed by combining the project evaluations for a specified time period.

The objectives and goals for the Greenways Program are summarized in Table III-1.

Program goals and criteria, as well as methods to measure Greenways Program and individual project success at addressing these goals are presented by program objective, below. The order of presentation does not necessarily correspond with importance. Every stream reach is somewhat unique in terms of configuration and characteristics and each will, therefore, vary in terms of the priority and importance of each of the various goals.

TABLE III-1

Objectives & Goals of the Greenways Program

- **Riparian, floodplain & wetland protection and restoration (Habitat)**
  - Protect and enhance areas with high habitat value
  - Restore habitat for native species
  - Protect areas for species of concern
  - Protect and restore high quality wetlands
- **Water Quality Enhancement**
  - Preserve and enhance ecologically important areas
  - Maintain and enhance stream channel stability
  - Preserve and enhance stream corridor water quality function
  - Strive to meet all current state of Colorado stream use classification criteria
- **Storm Drainage & Flood Mitigation**
  - Mitigate flood hazards and reduce the potential for property damage & loss of life
  - Minimize routine storm drainage problems
  - Maintain existing drainageway facilities
  - Manage water resources to provide appropriate in-stream flows and protect water quality and riparian habitat
- **Alternative Transportation Routes for pedestrians and bicyclists**
  - Provide a high degree of mobility for pedestrians & bicyclists
    - continuous, well connected, off-road
    - beautiful, safe, asset to community
    - minimize environmental impact
    - provide adequate signing and connections to road system
    - grade separated
    - maintain year round
    - priority given to provide access to public facilities & major activity centers
- **Recreation**
  - Promote Physical & Mental Health and Fitness
  - Nourish the Development of Children and Youth
  - Help Build Strong Communities & Neighborhoods
  - Promote Environmental Stewardship
  - Provide Beautiful, Safe & Functional Facilities
- **Protection of Cultural Resources**
  - Protect Historic Resources
  - Preserve & Promote Archeological Resources
  - Promote Public Understanding and Appreciation of Historic and Archaeological Sites

Construct the Greenways system in a cost effective manner, taking advantage of unique

opportunities, partnerships and multi-purpose projects.

Terrestrial Habitat Goals

1. Protect and enhance areas with high habitat value. Areas of high habitat value include those areas of high bird species richness, areas of high native plant habitat value, areas with high vegetation structure score and wetlands with high or very high wildlife habitat value. Such areas would be protected from future alteration or degradation. Riparian areas meeting these criteria would be protected and enhanced.

2. Restore habitat for native species. Degraded areas within a drainage that has high habitat values, which have good restoration potential and minimal conflicts with adjacent land uses, would be identified for restoration activities.

3. Protect areas for species of concern. Areas which currently contain species of concern would be protected. Potential habitat for species of concern with good restoration potential would be restored. These areas should be protected from future degradation.

4. Protect and restore high quality wetlands. All wetlands which are categorized as significant under the city's wetland ordinance would be protected from degradation. Significant wetlands include those which: are categorized under criteria set forth in the Boulder County Comprehensive Plan; perform at least one wetland function to a high or very high degree; provide habitat for threatened, endangered or special concern species; could be made significant through reasonable changes in management practices, and/or; have a hydrological connection to a significant wetland and which, if impaired would

adversely affect the significant wetland. High priority wetlands would be enhanced and restored, and techniques would be explored for protecting buffer zones surrounding these wetlands from degradation.

Criteria for Evaluating Program Success at Achieving Goals:

Using current data, proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated goals.

- acres of very good bird habitat affected;
- acres of very good native plant habitat affected;
- acres of very good vegetation structure affected;
- acres of enhanced or restored bird habitat;
- acres of enhanced or restored native plant habitat;
- acres of enhanced or restored vegetation structure;
- acres of habitat for special concern species affected;
- acres of potential habitat for special concern species enhanced or restored;
- acres of wetlands temporarily/permanently affected;
- acres of wetlands enhanced or restored.

Water Quality Goals

1. Preserve and enhance ecologically important areas. The city will maintain or improve aquatic habitat conditions. The city will incorporate protection strategies for aquatic habitat parameters in the Greenways Design Guidelines.

2. Maintain and enhance stream channel stability. The city will minimize stream bank erosion and maintain and enhance stream bank vegetation stability to an average of "good" for stream reaches within urbanized areas. To achieve this goal, it will be necessary to incorporate wetlands protection best management practices, and a vegetation enhancement program into the Greenways Program design criteria.

3. Preserve and enhance stream corridor water quality function. The city will protect and enhance the groundwater recharge function within the Greenways areas by achieving no overall net loss of existing wetlands and riparian areas, functions and values. To achieve this goal, it will be necessary to develop and implement design standards which minimize the use of concrete and other non-porous materials in riparian areas, and to identify areas of potential wetlands banking (improving, restoring, expanding existing wetlands to compensate for loss of wetlands in other areas) opportunities.

4. Strive to meet all current classification criteria under state of Colorado stream use classification for Boulder Creek and its tributaries. The city must maintain water quality suitable for recreation uses such as fishing, wading and boating in Boulder Creek and its tributaries. Accomplishment of this goal will require monitoring and tracking of Boulder Creek and tributary water quality, education of homeowners along the creeks and trail users regarding appropriate handling of household chemicals and human and animal waste, and education of homeowners, city staff and contractors regarding appropriate choice and handling of fertilizers, herbicides, pesticides and other chemicals in areas adjacent to stream corridors.

Criteria for Evaluating Program Success at Achieving Goals:

Using current data and the aquatic habitat assessment methodology, proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated drainage, flood management and water resources goals.

- linear feet of preserved high quality, primary, secondary and tertiary aquatic habitat;
- linear feet of improved primary, secondary and tertiary aquatic habitat;
- linear feet of stream banks improved to "good" or better vegetation stability ranking;
- acres of created, restored or enhanced wetlands;
- achievement of stream designated use.
-

Drainage, Flood Management and Water Resources Goals

1. Mitigate flood hazards and reduce the potential for property damage and loss of life. The city will continue to regulate new uses and developments within the area which could be expected to be inundated by a 100-year flood. The 100-year flood plain, for purposes of regulation, is divided into the

flood storage area, the flood conveyance zone, and the high hazard zone. In developed urban areas, where practical and desirable, the city attempts to eliminate existing uses and construction within the 100-year flood plain, flood conveyance zone or high hazard zone that are inconsistent with the regulations. The practicality and desirability of eliminating existing uses is based on cost/benefit comparison, potential for loss of life, aesthetic and environmental issues and availability of financial resources. The city also may also implement measures to reduce the area encompassed by the 100-year flood plain, flood conveyance zone or high hazard zone in developed urban areas. This allows existing uses to continue while meeting the goal of the regulations.

Where it is not practical or desirable to eliminate existing uses and construction or reduce the area encompassed by the 100-year flood plain, the city considers the objectives for more frequent flood events, such as the 25-year or 50-year flood event. Where practical, the city will also provide emergency access along city streets during major storm events.

2. Minimize routine storm drainage problems by providing adequate facilities along major drainageways. In this regard, the city endeavors to design and construct drainageway facilities that are aesthetically pleasing and beneficial to wildlife habitat and which minimize damage to development and public infrastructure, erosion and impacts to water quality.

3. Maintain existing drainageway facilities. The city tries to identify drainageway improvements that reduce the expense and impacts associated with on-going maintenance, provide adequate drainageway easements and access for on-going maintenance, and maintain flood flow design capacity, with mitigating associated temporary impacts to wetland and wildlife habitat.

4. Manage water resources to provide appropriate base flows and protect water quality and riparian habitat. The city has as a goal to negotiate agreements with irrigation ditch companies to separate the crossing of irrigation ditches with major drainageways to eliminate the potential for damage to development and public infrastructure along the irrigation ditches and to secure a base flow in the major drainageways.

Criteria for Evaluating Program Success at Achieving Goals:
Using current data, proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated drainage, flood management and water resources goals.

- Reduction in the number of structures subject to impact due to location within the 100-year flood plain;
- Reduction in the number of structures subject to impact due to location within the high hazard zone.
- Reduction in area (acres) encompassed by the 100-year flood plain;
- Number of drainage/irrigation ditch crossings eliminated;

Recreation Goals

1. Promote optimum physical and mental health and fitness in a balanced lifestyle which prepares people for full and productive participation in family, work, social and community life. The city desires to provide, coordinate and/or facilitate varied opportunities within Greenways areas for a broad spectrum of recreation including individual and team sports, indoor and outdoor programs, and organized and unorganized activities. Activities near Greenways areas will support workplace productivity and morale and will address the social, emotional, creative and spiritual needs of users.

2. Nourish the emotional, physical and social development of children and youth. In order to achieve this goals, the city will provide, coordinate and facilitate services near Greenways which address the specific needs of children, youth and their families; coordinate and facilitate opportunities for safe, constructive and challenging use of leisure time; enhance opportunities for leadership development; and promote the development of lifetime leisure skills.

3. Help build a strong sense of community and neighborhood identity and develop understanding and harmony among community users. To achieve this objective, the city must provide public gathering places and focal points within and near the Greenways corridors; sponsor and support community-wide, neighborhood, and special interest events within and along the Greenways; provide equity in access to Greenways for all citizens; provide programs which bring diverse individuals together in a spirit of mutual learning and cooperation; and promote volunteerism and volunteer training opportunities for development, use and maintenance of the Greenways.

4. Act as stewards in preserving and restoring the health of the natural environment. The city will protect and expand the urban forest environment. It is necessary to maintain a balance between serving public needs for recreational programs and facilities and respecting and being sensitive toward the natural environment.

5. Provide places of function and beauty which refresh the spirit and increase life satisfaction. The city will balance ease of maintenance, functionality, and aesthetic appeal for both users of services and those passing through park and recreation lands through the design and landscaping of parks. The city will allow opportunities for tranquil reflection on the complexity and beauty of nature, while maintaining park and recreation facilities along the Greenways in excellent condition and managing them so they do not exceed design or carrying capacities. Measures will be taken to enhance visitor and employee safety and reduce vandalism and other criminal activity in park and recreational facilities along the Greenways corridors.

Criteria for Evaluating Program Success at Achieving Goals:

Proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated recreation goals:

- number and type of recreational uses supported by proposed Greenways project;
- number and type of recreational uses specifically for children and youth supported by proposed Greenways project;

- number and type of neighborhood and community events anticipated in proposed Greenways project area;
- access limitations;
- type/description of volunteer opportunities provided by proposed project;
- number of complaints/complements received from recreational users of stream reach;
- number of accidents/injuries/required repairs by stream reach.

Transportation Goals

1. Provide a system of continuous, well-connected, off-road routes for pedestrians, bicyclists and other users. The city will eliminate breaks and discontinuities in the sidewalk system, upgrade existing pedestrian facilities cooperatively with land owners, inventory and evaluate multi-use paths, and ensure adequate connections of the pedestrian system to public transit. In addition, primary and secondary bicycle corridors will be identified with the goal of providing continuous facilities within these corridors. Corridors will be coordinated with other entities and jurisdictions.

2. Construct facilities that are beautiful, safe and an asset to the surrounding community.

3. Construct and maintain Greenways paths in a way the minimizes negative environmental impact while still maintaining the transportation function.

4. Provide adequate signing and connections to the road system to integrate the Greenways trails with the overall transportation system.

5. Construct the Greenways paths to be grade separated to provide safety and comfort to all levels of users, especially children and novice riders that are not equipped to ride on the roadway system.

6. Maintain Greenways paths year-round to support their function as a transportation facility and to meet the expectations of users.

7. Prioritize construction of Greenways segments to provide access to public facilities and major activities centers.

Criteria for Evaluating Program Success at Achieving Goals:

Proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated transportation goals:

- length of path built within any stream reach;
- number of users
- number of reported accidents and crimes within any stream reach;
- number of adjacent property owner complaints/complements;
- length of path built that provides off-road connection to a school;
- number of snow, ice, etc. maintenance complaints received for each stream reach;

- public facilities/major activities centers connections for each project;
- number of Greenways projects incorporating multiple purposes and sources of funding.

Cultural Resources Goals

1. Protect Historic Resources. Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or designated as a City Landmark. Cultural properties which are owned by the city, such as Eben Fine and Central Parks, should have preservation of their historical integrity as a priority. While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible. The Boulder Valley School District and the University of Colorado should be encouraged to maintain significant historic resources on their properties which intersect the Greenways system.

2. Preserve & Promote Archaeological Resources. Prehistoric and historic archaeological sites within the Greenways system are rare due to obliteration by flooding, historic disturbance associated with development of the area, and Greenways trail and landscaping projects. Archaeological sites such as the Boyd Smelter and City Dump at Scott Carpenter Park should be protected from looting. Any future earth disturbing activities near these sites should be monitored by a professional archaeologist to ensure that archaeological site components are not destroyed.

3. Promote public understanding and appreciation of historic and archaeological sites. Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway. The most appropriate location for historical interpretation is along Boulder Creek, Reach 7 - from Eben Fine Park to 9th Street - or to Broadway. While some the history of this area cannot be illustrated by physical remains or structures, it can be readily demonstrated with historic photos. This should be done in a manner to provide continuity with the interpretive signs installed by Boulder County for the Pioneer Trail, which extends west up Boulder Canyon from Eben Fine Park.

Criteria for Evaluating Program Success at Achieving Goals:

Proposed Greenways projects can be evaluated in terms of the following criteria to evaluate their ability to achieve the stated cultural resources goals:

- Number of significant cultural resources which are nominated to the NRHP, SRHP or designated as local landmarks within any stream reach;
- Number of cultural resources for which Greenways Project design and implementation includes active preservation strategies;
- Number of opportunities for historic interpretation that are developed within any stream reach.

D. Project Opportunities

Based upon the goals identified for each of the Greenways Program objectives, as well as the Transportation Master Plan, the Comprehensive Drainage Utilities Master Plan, the Parks and Recreation

Master Plan, the North Boulder Subcommunity Plan, the Aquatic Habitat Study and the Greenways Riparian Habitat Assessment, staff identified and evaluated projects and opportunities for each of the Greenways objectives along the designated tributaries and Boulder Creek. This information was presented at a public meeting held on March 2, 2000, as well as 6 public hearings during July and August 2000 in front of the five boards that have an interest in the Greenways Program with City Council accepting the proposed projects and opportunities on September 19, 2000. Cultural resource information was added following completion of the Cultural Resource Inventory of the Boulder Greenways in February 2001. Based on this input, staff has prepared a list of projects and opportunities that are shown on the Greenways Master Plan Map (Appendix I-1) and described in the Greenways Master Plan Update Reach Inventory" (Table VII-1 in Chapter VII).

The Greenways Program has adopted an opportunistic approach to achieve its multiple objectives throughout the system. Frequently, specific efforts within a Greenway corridor can be completed in conjunction with transportation, park, flood control, or private development projects funded from outside the Greenways budget. Major outside funding from such sources as the Urban Drainage and Flood Control District (UDFCD), the Colorado Department of Transportation (CDOT), and Federal Aid for Urban Services (FAUS) has allowed the Greenways system to expand and complete projects at an accelerated rate, with a much lower direct cost to the city. Cooperation with the University of Colorado and the Boulder Valley School District has resulted in extension of Greenways facilities through properties belonging to those entities. Through the site review process, private developers may provide conservation easements to the city along the program tributaries, as well as fund and construct trail links, park connections and underpass installations.

Projects for most of the objectives of the Greenways Program are budgeted under other departmental and divisional budgets. Since all of the Greenways goals and objectives except habitat restoration are covered under the individual master plans and associated city work plans, a list of environmental projects and opportunities has been developed as stand alone projects to be undertaken by the Greenways Program. These projects are shown on the Greenways Master Plan Map (Appendix I-1), described in the Reach Inventory, Projects and Opportunities (Table VII-1), and the top ten environmental projects are listed in Appendix VII-3.

While the environmental projects have been prioritized, staff does not intend to prioritize the other proposed projects for the purpose of determining when projects will be scheduled. Some of these projects will be incorporated into the Greenways capital improvement program budget and others will be part of the individual department/division budgets, based on their priority within the individual capital improvement programs.

Staff has developed criteria for ranking each reach in terms of each objective. Ranking criteria are presented in Table III-2. Reach rankings were combined into a matrix that ranked each reach by objective for the purpose of balancing conflicting interests at the time a project is taken forward. This matrix is included in Table III-3. This matrix can also be used to identify opportunities to improve low quality habitat

in conjunction with other projects.

Conflicts arise in areas where the aquatic and riparian habitat were either classified as high and flood maintenance activities, flood improvements or a path has been proposed. Proposed projects may also conflict with Open Space management philosophies. Conflicts have been identified on seven creek segments. Specific recommendations on how to address these conflicts through the evaluation of design alternatives have been identified in the Greenways Master Plan Reach Inventory Projects and Opportunities (Table VII-1).

E. Environmental Project Identification

As part of the Greenways Master Plan update process, an interdisciplinary staff team reviewed recent environmental assessment data, field notes, photos, and aerial maps in order to identify opportunities for environmental projects along the Greenways corridors. The team included individuals with experience and training in environmental planning, water quality, riparian plant ecology, aquatic biology, stream restoration, fluvial geomorphology, and floodplain management. In a series of team meetings the group reviewed the current condition of the stream corridors in Boulder, identified areas appropriate for preservation, and identified opportunities for environmental enhancement and restoration projects. Types of environmental projects on the Greenways Master Plan Map and Reach Inventory include:

- Preservation of high quality terrestrial and aquatic habitat
- Enhancements to terrestrial and aquatic habitat
- Restoration and creation of riparian wetlands
- Construction of water quality best management practices for treatment of pollutants at stormwater outfalls, sediment collection and removal, and non-point source pollution filtering
- Removal of barriers to fish passage
- Increasing the width of expression of the riparian wetland and upland buffer area
- Limiting mowing
- Weed control
- Day-lighting piped, underground creek sections
- Removing structural channel segments and replacing with bio-engineered methods
- Property acquisition

Additionally, programs were identified to address system-wide environmental concerns. These included landowner education related to creek care, a maintenance program including weed control to maintain the Greenways to a "habitat" standard, and a revision to the Greenways Design Guidelines to help direct project designs in an environmentally sensitive and sustainable manner.

TABLE III- 2
Criteria for Ranking Greenways Projects by Objective

Habitat

High

- highest ranked reaches in Riparian Habitat Assessment for vegetative structure, native vegetation and bird habitat
- reaches with species of concern
- reaches with irreplaceable complexity & structure

Medium

- average ranked reaches in Riparian Habitat Assessment
- somewhat replaceable vegetation (good native, but poor structure)

Low

- low ranking reaches in Riparian Habitat Assessment
- areas suitable for restoration

Water Quality

High

- highest ranked reaches in the Aquatic Habitat Assessment
- high quality aquatic habitat coincident with high quality terrestrial habitat
- fair aquatic habitat adjacent or between high ranked aquatic habitat

Medium

- fair aquatic habitat
- confluences with Boulder Creek
- riparian or aquatic habitat good over majority of stream length but not necessarily overlapping

Low

- poor aquatic habitat

Transportation-criteria listed in order of importance

- relationship to major destinations such as parks and employment centers
- population density served, particularly relative to major destinations
- the lack of good alternative routes, particularly the inability to stay off of busy streets
- the amount of connectivity to the system added by the segment
- amount of the corridor already completed.

Recreation

High

- critical trail component is planned to connect or is within a current or future park, recreation area or community or citywide facility

Medium

- proposed improvement in this Greenways reach may impact the connectivity between park and recreation areas

Low

- proposed improvement in this Greenways reach is not located near and will not impact the connectivity to current or future park or recreation area

Flood-criteria listed in order of importance

- removes property from the high hazard zone or conveyance zone
- removes property from the floodplain
- reduces storm drainage problems

Cultural Resources

- presence of cultural site(s) which are listed or eligible for listing on the National Register of Historic Places,

State Register of Historic Properties, are Historic Landmarks, or are eligible for landmarking.

TABLE III-3

RANKING OF GREENWAYS OBJECTIVES BY REACH

for the purpose of determining overlapping opportunities and conflicts

Revised September 1, 2000

REACH	LOCATION	HABITAT	WATER QUALITY	TRANSPORTATIO	RECREATION	FLOOD	CULTURAL RESOURCES	PARK SITE	Managed by OPEN SPACE	CONFLICT
Fourmile Canyon										
FC 1	Diagonal to west side of soccer fields	H	H	L	M	L		✓	✓	
FC 2	west of soccer fields to 28th St.	M	M	N/A	N/A	H		✓	✓	✓ Flood/ O.S. Mgmt
FC 3	28th St. to 19th St.	M	M	H	H	H	✓	✓		
FC 4	19th St. to 13th St.	M	M	H	H	H		✓		
FC 5	13th St. to Open Space	M	M	H	H	H	✓	✓	✓	
Wonderland										
WC 1	North Goose Creek to Valmont Rd.	L	M	H	H	L		✓		
WC 2	Valmont Rd. to Foothills Pkwy.	M	M	N/A	N/A	L		✓	✓	
WC 3	Foothills Pkwy to 28th St.	H	M	M	H	M		✓		✓ Hab Trans
WC 4	28th St. to 26th St.	M	M	H	H	L	✓			

REACH	LOCATION	HABITAT	WATER QUALITY	TRANSPORTATIO	RECREATION	FLOOD	CULTURAL RESOURCES	PARK SITE	Managed by OPEN SPACE	CONFLICT
WC 5	26th St. to west side of Centennial	L	L	M	L	L	✓			
WC 6	Centennial to 15th St.	M	M	L	L	L				
WC 7	15th St. to Broadway	M	H	N/A	N/A	L				
WC 8	West of Broadway	M	H	N/A	N/A	L	✓	✓	✓	
Goose Creek										
GC 1 North Goose	Pearl Pkwy to Foothills Pkwy	L	L	H	H	N/A		✓		
GC 2 South Goose	Pearl Pkwy to Foothills Pkwy.	L	M	L	L	N/A				
GC 3	Foothills Pkwy to RR	H	L	N/A	N/A	N/A	✓			
GC 4	RR to 28th St.	L	L	N/A	N/A	H	✓	✓		
GC 5	28th St. to Folsom	L	L	H	M	H	✓			
GC 6	Folsom to 13th St.	L	L	N/A	N/A	M				
Elmers Twomile										
ETC 1	Goose Creek to Parkside Park	L	L	H	H	H		✓		
Boulder Creek										
BC 1	63rd to Goose	H	H	H	H	L			✓	✓ Hab Trans

REACH	LOCATION	HABITAT	WATER QUALITY	TRANSPORTATIO	RECREATION	FLOOD	CULTURAL RESOURCES	PARK SITE	Managed by OPEN SPACE	CONFLICT
BC 2	Goose to Foothills	H	H	M	L	L	✓		✓	✓ Hab Trans
BC 3	Foothills to Arpahoe	M	H	N/A	N/A	L			✓	
BC 4	Arapahoe to 30th St.	H	H	L	M	M				
BC 5	30th to Folsom	L	H	L	H	M	✓	✓	✓	
BC 6	Folsom to 17th	M	H	N/A	N/A	H	✓+***	✓		
BC 7	17th to mouth of Canyon	H	H	N/A	M	H	✓+	✓	✓	
Skunk Creek										
SC 1	Arapahoe to Research Park	H	M	N/A	N/A	L				
SC 2	Research Park to Wellman Canal	H	M	L	L	L				
SC 3	Wellman Canal to Baseline Rd.	M	M	M	M	L		✓		
SC 4	Baseline to Broadway	M	M	H	L	M				
SC 5	Broadway to city limits	H	H	N/A	N/A	L	✓		✓	
Bear Canyon										

*** + Connotes the presence of multiple significant cultural sites.

REACH	LOCATION	HABITAT	WATER QUALITY	TRANSPORTATIO	RECREATION	FLOOD	CULTURAL RESOURCES	PARK SITE	Managed by OPEN SPACE	CONFLICT
BCC 1	Boulder Creek to Foothills Pkwy.	H	M	N/A	N/A	M	✓		✓	✓ Hab Flood
BCC 2	Foothills to Baseline	H	L	N/A	N/A	L	✓	✓		
BCC 3	Baseline to Hwy 36	H	L	L	M	L				
BCC 4	Hwy 36 to Broadway	L	L	N/A	N/A	L		✓		
BCC 5	Broadway to Lehigh	L	L	M	M	L				
BCC 6	Lehigh to city limits	H	H	N/A	N/A	L		✓	✓	
South Boulder										
SBC 1	KOA Lake	M	M	N/A	N/A	L		✓	✓	
SBC 2	Lake to Arapahoe Rd.	H	M	L	M	L	✓	✓	✓	
SBC 3	Arapahoe to Baseline	H	H	M	L	L	✓	✓	✓	✓ Hab Trans
SBC 4	South of Baseline	H	H	N/A	N/A	M		✓	✓	✓ Hab Flood

IV. Planning, Permitting and Public Involvement Processes

A. Greenways Project Review Process

The interdepartmental nature of Greenways projects has in the past required project reviews by multiple boards. As a part of the Master Plan update, a less cumbersome process for Greenways project review and approval has been developed. The new process involves the establishment of a Greenways Advisory Committee (GAC). The GAC will be made up of one representative from the Water Resources Advisory Board (WRAB), Transportation Advisory Board (TAB), Parks and Recreation Advisory Board (PRAB), the Open Space Board of Trustees (OSBT) and Planning Board, designated by the chair of each of the boards. The members of the GAC will act as the representative and liaison for their respective board on Greenways issues and interests. The Committee will provide a single point of contact for the public to bring comments and allow an opportunity for discussion where all of the Greenways Program objectives are represented.

Capital Improvement Program (CIP)

The Greenways Coordinator, in conjunction with a group of staff representing all the objectives of the Greenways Program (Greenways Coordination Team) identifies projects for the CIP based on development activities, available outside funding sources and the opportunity to coordinate work with other city projects. The CIP is developed for a 6 year period consistent with the rest of the city.

Individual Project Review Process

The Greenways Coordinator or project manager, in conjunction with the Greenways Coordination Team develops alternatives and conceptual plans as part of the CEAP. Development of the CEAP for Greenways projects is consistent with other city CIP projects and includes review by the Development Review Committee. In general, a CEAP is prepared for projects which may have a significant impact on environmental, social or cultural resources; which involve neighborhood or community controversy, or; which involve one or more conceptual alternatives that require community input.

All capital projects ($50,000 or more) proposed within a Greenway (whether funded through the Greenways Program, a private developer or another city workgroup) will be reviewed by the Greenways Coordinator and Greenways Coordination Team for compliance with the Greenways Master Plan and Greenways Design Guidelines.

External Review of CIP and CEAP

The Capital Improvement Program (CIP) and Community and Environmental Assessment Process (CEAP) for Greenways projects will be reviewed by the Greenways Advisory Committee (GAC) in a public hearing. The Water Resources Advisory Board (WRAB), Transportation Advisory Board (TAB), Parks and Recreation Advisory Board (PRAB) and Open Space Board of Trustees (OSBT) will receive a copy of the CIP and CEAPs as an information item (non-agenda) with comments directed to the GAC and/or the Greenways Coordinator. The Greenways CIP will also be brought to the Planning Board for recommendation, consistent will all other city CIPs.

The GAC will provide recommendations to staff and the Planning Board on the Greenways Program CIP and will approve the CEAP subject to Council call-up. All projects on land managed by Parks or Open Space are taken to those respective boards in a joint hearing with the GAC for approval of the CEAP, subject to Council call up.

Project CEAPs for projects within a Greenway that are being funded outside the Greenways Program budget will be provided to the GAC as an information item to give the GAC an opportunity to provide comments to staff and/or the sponsoring advisory board, with the sponsoring advisory board approving the CEAP, subject to Council call up.

B. Checklist for Permit Compliance

There are usually a series of standard permit requirements for Greenways projects, and under certain circumstances, additional external reviews are needed:

Standard Project Permits:

- **Corps of Engineers Section 404 Permit**
  The U.S. Army Corps of Engineers District Engineer determines if the project qualifies for authorization under Nationwide Permits (most Greenways projects can be authorized under Nationwide Permits). If a Nationwide Permit is not deemed appropriate, an individual permit is required. The individual permit process has specific public notification provisions.
- **Municipal Wetlands Permit**
  The city notifies owners of properties within 300 feet of the project boundary and any other interested parties who have requested notification. These people have 14 days to comment on the proposal. The Floodplain and Wetlands Coordinator posts notice of the wetland permit application with the comment deadline. The Floodplain and Wetlands Coordinator may approve the permit application, deny it, or refer it to the Planning Board for decision. Floodplain and Wetlands Coordinator approvals or denials are subject to Planning Board call-up. Denials may be appealed to the Planning Board. Decisions not appealed or called up by the Planning Board become final 14 days following notification.
- **Floodplain Development Permit**
  The Floodplain and Wetlands Coordinator reviews and decides on all applications; however, if a change in a watercourse is proposed, the application is referred to the Planning Board. For high hazard and conveyance zone permits, the Floodplain and Wetlands Coordinator forwards the permits to City Council and publishes a newspaper notice. The permit becomes effective 21 days after issuance. City Council may call up variances or approvals.

Interdepartmental Cooperative Procedures

It has been established and agreed that Greenways projects affecting either Parks or Open Space property will be reviewed by the Parks and Recreation Advisory Board and/or the Open Space Board of Trustees, as appropriate. The Greenways Master Plan Map (Appendix I-1) shows Parks and Open Space sites and a list of these sites is also provided in Appendix IV-1. Appendix V-1 provides guidelines for projects on Parks and Open Space.

External Review and Approval Processes (as needed, depending upon jurisdiction)

- Urban Drainage and Flood Control District
  The UDFCD reviews and provides comments on proposed developments in or near floodplains at the request of local governments. The UDFCD also requires that drainage and flood control facilities constructed by, or approved for construction by, local governments be approved by the UDFCD in order for those facilities to be eligible for assistance from the UDFCD Maintenance Program.
- Colorado Department of Transportation
  Projects which affect Colorado Department of Transportation (CDOT) right-of-way of which rely on CDOT funding are subject to CDOT review.
- Boulder County
  Greenways projects which affect lands under Boulder County jurisdiction may require a County permitting process, ranging in scope from a County floodplain permit to a building or grading permit to an Areas or Activities of State Interest (1041) Permit. Most Boulder County permitting processes involve Planning Commission or other County advisory board review, as well as a public hearing before the Board of County Commissioners.
- University of Colorado
  Greenways projects which affect University of Colorado land will be coordinated with the appropriate University personnel.
- U.S. Fish and Wildlife Service - Threatened and Endangered Species
  U.S. Fish and Wildlife Service review of proposed projects for impacts to threatened and endangered species usually occurs in conjunction with the wetlands permitting process. The USFWS is provided with survey results or a statement of why surveys for individual species are not needed. The USFWS generally issues letters of clearance when projects will not adversely effect threatened and endangered species.
- Federal land managing agency review
  Projects which affect federal land undergo review by the land managing agency to ensure compliance with all federal legislation and management directives, including the National Environmental Policy Act (NEPA) and National Historic Preservation Act. Federal review processes usually have opportunities for public review and participation.

Post-Project Monitoring Report

During project design, permitting and construction, each Greenways project will have a post-project monitoring procedure developed by the Greenways Coordinator and Greenways Coordination Team. This procedure will outline any monitoring and reporting requirements associated with project permits (e.g., a Municipal Wetlands Permit may require 5 years of monitoring following completion of the project) and identify measures of project success and monitoring intervals for each of the primary goals and objectives addressed by the project. The Greenways Coordinator will be responsible for ensuring that post-project monitoring is completed and the results are reported to the Greenways Coordination Team. The Greenways Coordination Team will be responsible for developing a plan for correcting any post-project problems. Completion of corrective programs may be undertaken by maintenance staff, or, if under warranty, by project contractors.

Following completion of all monitoring requirements, a post-project monitoring report will be prepared for each project. The report will include:

- frequencies and types of monitoring;
- results of monitoring including photographic documentation;
- problems encountered (including complaints received, if any) and how they were resolved;
- suggestions for future projects.

In addition to providing valuable information concerning successful strategies for project completion, the post-project monitoring report will provide a baseline for evaluating project condition over time.

V. Service Provision Policies

The Greenways Master Plan builds on policies outlined in several existing adopted plans and policies including the Boulder Valley Comprehensive Plan, the Comprehensive Drainage Utility Master Plan and the Transportation Master Plan.

A. Boulder Valley Comprehensive Plan

Policies 4.07 and 4.15 of the Boulder Valley Comprehensive Plan, which is being updated during 2001, are addressed as part of the Greenways Program:

4.07

> The functional and aesthetic qualities of drainage courses and waterways shall be preserved and enhanced. A noncontainment approach to flood management shall be used on Boulder Creek. A generally non-structural approach to flood control that emphasizes a natural appearance shall be used on all major water courses and drainageways. In some cases a structural solution may be used, consistent with adopted master plans.

4.15

> The city shall prepare and maintain drainage utility plans that define maintenance needs, priorities for improvements, funding requirements, the character of necessary structural improvements, and water quality issues. The city shall prevent redevelopment of significantly flood-damaged properties in high hazard areas. The city shall prepare a plan for property acquisition of flood-damaged and undeveloped land in flood high hazard areas. Undeveloped flood high hazard areas will be retained in their natural state whenever possible. Compatible uses of riparian corridors, such as trails, recreation facilities, wildlife habitat, and wetlands shall be encouraged wherever appropriate.

The Greenways Program incorporates flood control measures as described by policy 4.07 in conjunction with riparian corridors, trails, recreation opportunities, wildlife habitat and wetlands.

B. The Storm Water and Flood Management Utility and the Comprehensive Drainage Utility Master Plan

The Storm Water and Flood Management Utility of the Public Works Department manages the entire storm water and flood management system for the city. The purpose and function of the utility, created in 1973, is to minimize the threat of flooding and flood damage resulting from storm water runoff. The November 11, 1988 Comprehensive Drainage Utility Master Plan (CDUMP) outlines the long-term program for flood management in terms of capital improvements; flood hazard mitigation; storm and surface water quality; and other utility efforts such as flood warning and education, protection and enhancement of wetlands, and property acquisition. The CDUMP is currently in the process of being updated.

A reduction to life-safety hazards and property damage, as well as improving water quality, are the main purposes of the plans and projects proposed in the CDUMP. The city regulates the use and construction within the area which could be expected to be inundated by a 100-year flood. This floodplain, for purposes of regulation, as well as for determining capital project priority, is divided into the flood storage area, the flood conveyance zone, and the high hazard area. For purposes of designing capital projects, the

city will apply an additional cost-benefit standard. For example, the city may consider improvements to less than a 100-year standard in some cases depending upon the cost of the project compared to the risk to lives or property.

The highest priority capital improvement project is currently the completion of the Goose Creek channel from 30th Street through Folsom Street. Other small, localized drainage problems will be addressed, depending upon the availability of funds. Property in the floodplain, especially within the high hazard zone, will be purchased, within funding limitations, both in pre-flood and post-flood modes.

The Storm Water and Flood Management Utility is funded through monthly service charges included in the city's utility bills. Single family dwellings are charged a flat monthly rate based on square footage of the lot. Business charges are derived using a formula that accounts for total area, amount of runoff, and amount of water stored on the property.

Currently, the Storm Water and Flood Management Utility contributes $150,000 per year to the Greenways Program. Flood Utility funds are administered by the Public Works Department and can be used for improvements providing or maintaining flood safety along streams, conveyance facilities including box culverts, water quality enhancements and habitat improvements.

Several flood control and drainage utility easements along the major drainageways and in areas throughout the floodplain are owned and managed by the city for the purposes of ensuring flood mitigation and stormwater conveyance. Most of these areas are included within the Greenways system.

C. Urban Drainage and Flood Control District

The Urban Drainage and Flood Control District was established by the Colorado legislature in 1969 for the purpose of assisting local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. The District operates five programs: Master Planning, Design and Construction, Maintenance, Flood Plain Management, and the South Platte River. Funding for these programs is derived from levies of 0.756 mill in Adams, Arapahoe, Denver, Douglas and Jefferson Counties, and 0.676 mill in Boulder County. (Boulder County is not levied the 0.1 mill earmarked specifically for the South Platte River Program.) The four programs relevant to the city of Boulder are described below.

The Floodplain Management program was established to prevent new flood damage potential from being introduced into the 100-year floodplains while encouraging the utilization of non-structural methods of flood damage mitigation. The District works with local governments to assure that they remain in the National Flood Insurance Program; assists local governments with floodplain regulations; delineates flood hazard areas; and assists local governments in the development of flood warning plans and the installation and maintenance of flood detection networks. The District funds a private meteorological service to provide daily forecasts of flood-producing events to local governments. It requires that drainage and flood control facilities constructed by, or approved for construction by local governments must be approved by the District for those facilities to be eligible for assistance from the District's Maintenance Program. Eligibility for assistance is determined by the Floodplain Management Program.

The District's Master Planning Program provides up to 50 percent of study costs for master planning efforts requested by local governments and having a multi-jurisdictional dimension. The five major concentrations in the Master Planning Program are major drainageway master planning; outfall systems planning; drainage criteria; support of local government stormwater NPDES discharge permitting efforts, and; special projects, such as channel and structure design in special circumstances, benefit-cost analyses, and wetland issues.

The Design and Construction Program provides funds for master planned improvements which are requested, owned and maintained by local governments. District funds must be matched by local governments. The District adopts a five-year capital improvement program each year which lists projects and District participation by county. From 1974 through 1998, the District expended $91 million in design and construction, of which approximately $9.2 million has been expended in the city of Boulder.

The District's Maintenance Program provides funding and assistance to local governments for drainageway maintenance activities in accordance with expenditure priorities established by the District. District-owned facilities receive funding first, followed by District-funded projects, projects funded by others, unimproved urban drainageways, and unimproved rural drainageways. From its inception in 1981 through 1998, the District has spent over $58 million on drainageway maintenance. From 1983 through 1998, the District Maintenance Program has expended over $3.2 million within the city of Boulder.

The work is divided into three types of activities: routine, restoration and rehabilitation. Routine maintenance consists of mowing, trash and debris cleanup, weed control and minor revegetation efforts. Restoration work is site-specific construction work to repair isolated drainageway problems, including detention pond mucking; trash rack cleaning; tree thinning; repairing local erosion problems, and; local channel grading, shaping and stabilization. Rehabilitation projects are major design and construction efforts which are intended to reclaim and re-establish existing facilities which have been damaged or neglected such that structural problems have developed. Examples include rebuilding or replacing drop structures; building low flow or trickle channels; establishing maintenance access into drainageways; and providing protection for existing channel improvements, box culverts, retaining walls, bridges and other facilities.

D. The Transportation Department and the Transportation Master Plan

Through the Transportation Master Plan, the city attempts to reconcile two somewhat conflicting goals. The first goal is to provide mobility and access within the city in a way that is safe and convenient. The second goal is to preserve Boulder's quality of life by minimizing the impacts from auto traffic such as air pollution, congestion, and noise.

The Transportation Master Plan balances these goals by creating a transportation system that provides not only good auto transportation, but also alternative forms of transportation such as walking, bicycling, and transit. The Plan proposes strategies to maintain and actually improve the auto system while at the same time creating new opportunities for other modes by completing the bicycle and sidewalk system and providing new types of transit options. The Plan also provides a funding mechanism to maintain and complete the auto, bicycle, and pedestrian systems.

The Transportation Master Plan includes a list of objectives which describe the desired future condition of Boulder's transportation system. Objectives for the year 2020 included in the current Transportation

Master Plan include no growth in long-term vehicle traffic; reduction in single-occupant vehicle traffic to 25 percent of daily trips; continuing reduction in mobile source emissions of pollutants; and, no more than 20 percent of arterial roadways congested.

The Bicycle System Master Plan is a component of the 1995 update of the Transportation Master Plan which articulates the city's goal to double the total number of bicycle trips between 1994 and 2020 from 80,000 to 160,000 trips per year. The Greenways paths which parallel a bicycle corridor, increase mobility within the system, or provide new corridors opportunities are incorporated directly into the bicycle corridor network. In some cases, the Greenways system provides access not available in the street grid. The Bicycle System plan acknowledges that the Greenways system will remain important to cyclists who opt to ride away from traffic or who ride primarily because they enjoy the human and natural interactions which the Greenways paths provide.

The Transportation budget contributed $150,000 per year to the Greenways Program from 1989 through 1992, after which the contribution was increased to $300,000. This contribution has been reduced to $150,000 since 1999. Transportation funds are administered by the Public Works Department and may be used to construct trails (usually paved) and related facilities which provide a substantial transportation benefit to a relatively large number of users.

The Transportation Master Plan is updated every five years. The current update, which is based upon trends and projections to the year 2020, was adopted by city Council in July 1996.

E. The Parks and Recreation Department and the Parks and Recreation Master Plan

A primary mission of the Parks and Recreation Department is to provide recreation programs to serve the needs of the citizens of the city of Boulder. The basic fabric of the parks and recreation system is the neighborhood and community parks. Other components of the city's park and recreation system include regional parks, park corridors, preserves, athletic complexes, recreation centers and various special use facilities.

Smaller parks typically provide the visual relief of a quiet, green place with a picnic table or benches and perhaps a children's play area; larger parks tend to have more defined areas for different uses - playing fields, basketball courts, shelters, barbecues, a more extensive playground. Some urban parks incorporate significant land in a largely natural state and can be used for exploration and nature study.

The Parks and Recreation Master Plan recognizes the community need for more undeveloped open land or natural parks within the city for quiet, passive recreation. Among the various goals for the future, the Parks and Recreation Master Plan envisions a system of safe and scenic paths and trails connecting all parks and facilities and recommends cooperation with the Greenways Program to expand and complete the urban trails system linking parks. The Greenways Program complements the objectives of the Parks and Recreation program by providing passive recreation areas along tributary drainages, by protecting and reclaiming open areas along the included drainageways, by linking parks and recreational facilities within the city, and by providing a trail system for rollerblading, bicycling, running and other recreational activities.

The Parks and Recreation Department administers Lottery funds. The Greenways Program received 49.5 percent of lottery funds from 1989 through 1992, after which funding was reduced to $150,000 per year. Lottery funds may be used for trail and related facility construction, environmental rehabilitation projects, and passive recreational improvements.

F. Open Space and Mountain Parks Department

The Open Space and Mountain Parks Department operates in accordance with Open Space Charter provisions and missions, among which are to preserve and restore natural areas with associated unusual, spectacular, historically important, scientifically valuable or rare examples of native flora and fauna; preserve water resources in their natural or traditional state, including wildlife habitats or fragile ecosystems; promote utilization of program lands for passive recreational use; preserve agricultural land uses and land suitable for agricultural production and; utilization of lands to prevent encroachment on floodplains.

The Open Space Program has greatly contributed to the preservation of native ecosystems and to the utilization of land for shaping the development of the city. The Greenways Program complements the Open Space Program by identifying additional strategies for preserving riparian wildlife habitat and natural ecosystems within the city, by providing additional passive recreation opportunities and areas, and by linking the city's open areas.

In 1993, the Open Space/Real Estate Department, in conjunction with the Parks and Recreation and Public Works Departments, issued guidelines for tributary greenways on open space and park lands. These guidelines facilitate the integration of the goals and objectives of the Greenways, Parks and Recreation, and Open Space programs; promote the evaluation of community and environmental impacts and benefits as well as project costs; present methods for planning, construction and management of proposed greenways on open space and park lands in a manner beneficial to the public and in keeping with the provisions of the Open Space Charter; and define a process for tributary project review, public hearing and final approval prior to construction. The *Tributary Greenway Guidelines for Open Space and Park Lands* are included as Appendix V-1 of this Master Plan.

The Open Space and Mountain Parks Department follows Long Range Management Policies to define program goals, decision-making process and implementation techniques within a 20-year planning horizon. Long Range Management Policies are updated every five years. In addition to the Long Range Management Policies, resource plans and area management plans are developed to further guide management of Open Space lands. Resource plans provide system wide management guidance for various resources and are integrated into specific on-the-ground actions contained within area management plans. The goals of area management planning are to provide guidance and direction for management of specific areas of Open Space; develop a framework for evaluating and incorporating appropriate uses of Open Space according to the Open Space Charter; prepare inventories and analyses of resources; provide opportunities for public participation, and; to coordinate resource management, protection and planning with other city departments and public and private landowners.

G. The Urban Open Land Program and the Urban Open Lands Master Plan

Urban Open Lands was identified in the 1996 Boulder Valley Comprehensive Plan as a proposed system of open places within the city of Boulder which collectively provide opportunities to experience the natural

environment, meet as a community, and move through the city. The Urban Open Lands Plan was a comprehensive blueprint for building this system by linking public and private open spaces and developing cooperative relationships among diverse partners. This plan was not adopted but warrants further consideration. The Urban Open Lands program would weave together multi-functional, human-made and natural systems within the city to define a new urban design framework. Urban systems such as parks, schools, and major transportation corridors could be linked to natural systems, creating a rich mosaic of interconnected undeveloped spaces. This interconnected system would also provide water quality enhancement functions by filtering and treating stormwater as it flows to Boulder Creek and its tributaries.

The Greenways Program would complement the Urban Open Lands Plan by furthering open land and wildlife corridor protection goals within the city, while providing for bicycle and pedestrian connections within the city's flood control system. Many segments of the Greenways system are included in the plan for the Urban Open Lands network.

H. Planning and Development Services, Subcommunity Planning

Boulder's service area has been divided into nine subcommunities. The goal of subcommunity planning is to address multiple planning issues on an area-wide level, including transportation, land use, zoning, recreation and open land availability. Subcommunity plans address Greenways Program objectives related to recreation needs, environmental protection, bicycle and pedestrian connections, and subcommunity identity and character.

A plan for the North Boulder subcommunity was adopted by the City Council in August 1995. This plan outlines a framework and implementation strategies for the Greenways Program within that subcommunity. The Greenways Master Plan map and update have been reviewed for consistency with the North Boulder subcommunity plan.

The North Boulder Subcommunity Plan includes specific goals, objectives and action plans that are relevant to the Greenways Program. Among these are recommendations for channel, wetland, habitat, and water quality protection, restoration and enhancement along segments of Fourmile Canyon Creek and Wonderland Creek. The action plan for achieving these goals includes wetland mitigation, Greenways improvements, and site acquisition. In addition, one of the primary concepts of the subcommunity plan is to provide improved bicycle and pedestrian facilities by connecting the existing pedestrian and bicycle network along and near Fourmile Canyon Creek.

VI. Future Programs

During the Master Plan update process, several opportunities to add or expand current Greenways activities were identified by the interdepartmental Greenways Coordination Team.

A. Education and Community Opportunities

Possible future public education efforts could include a program designed to educate adjacent property owners concerning the effects of weeds and ornamental escapees on the vegetation structure and habitat value of the Greenways and encouraging removal of exotic plantings.

Several restoration themes have been suggested as a result of the habitat assessment study. These include:

- Creek Care 101: A certificate training program for people of groups whose property includes riparian areas could be established. This program could include basic lessons in creek hydrology, riparian ecology, and training in management techniques appropriate for restoration and maintenance of the natural functions. Each training course could culminate with an on-the-ground project in the focus area/tributary.
- Land Stewardship Extension: This program would provide brochures, web documents, handbooks, access to tools and other forms of technical assistance to give people the information and implements they might need to undertake restoration projects.
- Adopt-a-Reach: Many business facilities are located along the creeks (Arapahoe Village, CU Research Park, Flatiron Park, Goose Creek downstream of Folsom St., etc.). Establishing a litter/trash pick-up program equivalent to the adopt-a-road program could improve conditions along the creeks and provide public relations benefits. Eventually, more significant projects could be undertaken.
- Interpretive Program: The Greenways trails are central and accessible. Many people use them as transportation corridors and recreational facilities. Fewer know the interesting stories the corridors have to tell. City staff and local naturalists could offer nature walks and rides, install interpretive signs, and develop brochures.
- Partnerships with Schools: Several public and private schools are involved in environmental studies programs. Many are examining water quality the Colorado Division of Wildlife's River Watch program. Many opportunities exist to broaden the educational experience to include botany, zoology and issues of land management.

Another public education opportunity exists for the interpretation of cultural resources within the Greenways system. Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway.

The most appropriate location for historical interpretation is along Boulder Creek, Reach 7 - from Eben Fine Park to 9th Street or to Broadway. The considerable and fascinating history of this area is summarized in Appendix III-1. While some of the historic sites in this area have no visible physical remains, they can still be readily demonstrated with historical photos. This would also provide some continuity with the interpretive signs done by Boulder County for the Pioneer Trail, which extends west up Boulder

Canyon from Eben Fine Park.

B. Environmental/Habitat Improvement and Preservation

Environmental Project Funding

Environmental improvement and preservation projects that have been identified for the Greenways will be included in the Capital Improvement Program and accomplished using Greenways Program funds. Completion of these projects might be accelerated through encouraging contributions from private development, obtaining grants, etc.

Wetlands Banking

A wetlands mitigation bank is a wetland area that has been restored, created, enhanced or preserved, which is then set aside to compensate for future conversions of wetlands for development activities. The city currently does not have a wetlands mitigation banking process, although the possibility of this type of program has been evaluated in the past. Among the benefits of establishing a wetlands mitigation bank are that uncertainty and delay are reduced for qualified projects, and that successful mitigation can be ensured, since compensatory wetlands areas exist and are functional in advance of proposed project impacts.

Further discussions of such a program are warranted. A wetlands banking program basically facilitates mitigation in advance of wetlands impacts. As wetland enhancement projects along the Greenways are completed, they are "banked" as credits against future city projects which may be unable to avoid wetland effects. The credits banked in advance of proposed impacts may streamline permitting processes. In addition, since mitigation has been successfully completed in advance of proposed wetlands impacts, replacement areas are already established and functioning. The development of a wetlands mitigation bank would not only benefit future Greenways projects, but other city projects (Transportation, Utilities, etc.) which may involve wetland impacts. "Banked" wetlands could also serve as examples of successful wetlands mitigation projects for private developers.

C. Stewards of the Greenways

Public stewardship for the Greenways could be encouraged through an "Adopt-a-Trail" program. Members of the public would be encouraged to collect trash, monitor conditions along a specified reach, etc. and report any perceived problems to the Greenways Program.

Various counties and states throughout the country have implemented successful "Adopt-a-Trail" programs. A few of the programs that are especially pertinent to the Greenways Program are:

- Greenways Walkers: People who frequent the Greenways can be encouraged to pick up trash and report maintenance problems to the Street and Bikeway Maintenance hotline at 303-413-7177.
- Greenways Adopters: Adopters my be individuals, families or groups. Basic tasks, following appropriate training by city staff, would include vegetation trimming, drainageway cleaning and littler removal. With experience, volunteers could be involved in the performance of more complicated maintenance and enhancement tasks.
- Special Projects: Groups or individuals may be interested in involvement in single project, rather than on-going monitoring and maintenance responsibilities. The Greenways Coordinator could establish and maintain a list of projects for community volunteers.

D. Monitoring Program

All future Greenways projects will have a specific monitoring plan which will be developed during design as a part of the construction budget for the project. The plan will identify criteria through which to evaluate project success, will establish a schedule for achieving these criteria, and will specify the frequency and duration of monitoring that is required for project permit compliance (e.g., wetlands monitoring usually continues on an annual basis for 5 years following project completion), and any site-specific conditions that should be monitored. Monitoring plans will help to ensure that appropriate corrective measures are implemented if problems arise during the critical post-construction period.

E. Additional Services

Additional services that are not currently being provided and are not included as part of the enhanced practices were also identified and evaluated. These services include:

Providing Restrooms

Restrooms are provided on a seasonal basis at Even Fine Park and Martin Park. The initial cost for a restroom is $150,000 to $200,000. The cost to maintain a restroom including cleaning two times per day is about $700 per month. While there have been requests for restrooms, they are a major cleaning and maintenance problem. As an alternative, the group decided to evaluate the locations of existing public restrooms near the Greenways for the purpose of making this information available to the public.

Drinking Fountains

There are several drinking fountains along the Boulder Creek Path. The initial cost for a frost-free (year-round) fountain is about $3000, if there is a nearby water line. Drinking fountains require minimal maintenance. Drinking fountains have often been donated. Proposed locations of drinking fountains have been identified on the Greenways map and are shown in the Reach Inventory presented in Section VII.

Trash Cans

Trash cans are primarily located along the Boulder Creek Path and in city parks. The initial costs of a trash can ranges from $30 to $1000 each. Emptying of cans would need to be done at least 2 times per week and up to once each day, depending on their location. One full-time employee plus one vehicle would be required for the entire system. Dump fees would also be incurred. While there have been requests for additional trash cans, the limited number of existing cans has not caused a trash problem.

Lighting

Lighting can be an important factor in Greenways safety. A street light currently costs about $2700, plus on-going electricity costs. Street lights must be individually evaluated in terms of their effects on habitat, and positive and negative impacts must be compared on an individual basis.

Benches

Benches cost between $280 and $1200 and are usually provided through memorial donations. Associated maintenance costs are very low.

Other Improvements

A number of other potential improvements, such as construction of rest areas, providing for increased police protection, installation of safety phones, and installation of additional signage have been suggested. These improvements were not individually evaluated in this master plan update.

VII. Future Opportunities

A. Greenways Projects and Opportunities

Based on information presented in the Transportation Master Plan, the Comprehensive Drainage Utility Master Plan, the Parks and Recreation Master Plan, the North Boulder Subcommunity Plan, the Aquatic Habitat Study (part of the Boulder Creek Watershed Study), the Greenways Riparian Habitat Assessment and the goals and criteria for each of the Program objectives, the Greenways Coordination Team identified projects and opportunities for each of the Greenways objectives along Boulder Creek and the designated tributaries. Projects and opportunities are shown on the Greenways Master Plan Map (Appendix I-1) and are described in Table VII-1 (Reach Inventory, Projects and Opportunities). A summary of Transportation Changes from the May 1998 Greenways Map represented on the current map and reach inventory is contained in Appendix VII-1.

A summary of the identified projects and opportunities is shown in Table VII-2. Cost estimates for each of the proposed improvements are contained in Appendix VII-2.

B. Criteria for Projects

The Greenways Program has adopted an opportunistic approach to achieve its multiple objectives throughout the system. Frequently, specific efforts within a greenway corridor can be completed in conjunction with parks, transportation, flood mitigation, or private development projects funded from outside the Greenways budget. Projects for most of the objectives of the Greenways Program are budgeted under other departmental and divisional budgets. It was determined that the purpose of the Greenways budget is to provide an opportunity to construct a project which meets more than one of the objectives of the Program and may not necessarily be a priority when the objectives are viewed separately.

All of the Greenways goals and objectives except the environmental objectives are covered under individual master plans and associated city work plans. Consequently, a prioritized list of environmental projects and opportunities was developed to facilitate identification of potential funding sources for these projects. A method was developed in order to prioritize stand-alone environmental projects along the Greenways as part of the Master Plan process. The prioritization method ranks the projects identified on the Greenways Master Plan Map and Reach Inventory, Projects and Opportunities using scores from recent environmental studies, the matrix of overlapping and conflicting objectives, and the results of a stress analysis on environmental impairment of water quality and habitat.

The stress analysis was based on a methodology developed by The Nature Conservancy entitled, "The Five-S Framework for Site Conservation." The method involves identifying specific functions of the Greenways that are environmentally impaired system-wide, linking the impairment to an active threat or stress to the system, evaluating how severe and widespread the stresses are, and determining mitigation strategies for alleviating the stresses. These mitigation strategies were then assigned weighting factors in terms of feasibility, cost, and effectiveness in reducing the identified stresses. The results of the stress analysis are provided in Table VII-3.

Since the stress analysis was system-wide, it was necessary to apply the results to site specific projects and strategies. The environmental projects and opportunities identified as part of the Master Plan were

tabulated and evaluated to determine which strategies were proposed for each project. The ranking method utilized this tabulated list, with the strategies weighted according to the results of the stress analysis. Additional components of the ranking method included the quality of the habitat based on environmental scores from recent studies, the amount of overlap or conflict with other projects proposed for other Greenways objectives within the reach, the ownership of the property, and the risk of failure. The results of the project ranking procedure are provided in Table VII-4.

The top 10 environmental projects identified using the ranking method were considered for the 2002-2007 CIP. Descriptions of these projects are included in Appendix VII-3. The inclusion of specific environmental projects was based on the ranked list and on the timing of other projects along the Greenways following an opportunistic approach. Stand-alone environmental projects do not have a dedicated funding source at this time, therefore additional funding will be necessary to complete stand-alone projects.

C. Cultural Resources Recommendations

The Greenways cultural resources inventory identified the historical significance of individual historic sites within the Greenways corridors. Greenways projects which potentially affect sites listed or eligible for listing on the National or State Register of Historic Places should consider the potential effects of project implementation on site significance as a part of the Project CEAP. Coordination with the Landmarks Board will be needed for projects affecting city landmarks.

Historic Site Significance

- Of the previously recorded sites in the study area, only **5BL358**, the Switzerland Trail, is listed on the NRHP.
- Three sites are City Landmarks - Highland School (**5BL364**), the Bandshell (**5BL5680**), and the Boyd Smelter (**5BL7094**).
- Unaltered segments of the Boulder & White Rock (**5BL859**), Silver Lake (**5BL3813**), Anderson (**5BL3935**), Boulder & Left Hand (**5BL5820**), Farmers (**5BL6632**), North Boulder Farmers (**5BL6879**), and Wellman (**5BL8819**) ditches are all eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.
- The Valmont Power Plant (**5BL799**) and associated Leggett Inlet and Outlet is eligible to the NRHP for its association with energy development.
- The Colorado & Southern RR (**5BL400**), Union Pacific RR (**5BL469**), and the Colorado & Northwestern Train (**5BL606**) are eligible for nomination to the NRHP for their association with Transportation.
- Boulder High School (**5BL4675**) is eligible for nomination to the NRHP as a type of construction and for its association with significant persons and events (Education).
- The Watts Residence (**5BL5929**), the Parce/Ronshoot/Pollard Residence (**5BL6167**), and the Pollard/Tisone Residence (**5BL6169**) are individually eligible for nomination to the NRHP as a type of construction and for their association with significant persons. They are also eligible as elements of a potential Hillside Road District.
- The Green Mountain Cemetery (**5BL5954**) is eligible for nomination to the NRHP for its association with Community Development and as a type of construction.
- The City Dump (**5BL8820**) is eligible for nomination to the NRHP as an archaeological site, as it

is likely to yield information important to history.

- The Civilian Conservation Corps stonework (**5BL8821**) is eligible for nomination to the NRHP as a type of construction and for its association with Education and with the CCC and the Great Depression.
- Sites which are not individually eligible for nomination to the NRHP may be eligible as elements of districts. They are also eligible for nomination to the SRHP or for City Landmarking. This would include Eben Fine Park and the shelter and restroom (**5BL6015-6017**); Central Park (**5BL6063**); the field buildings at Boulder High (**5BL5990-59994**); the Broadway Bridge (**5BL6062**); Yocom Studio (**5BL1129**), and; Wonderland Lake (**5BL3814**).

Management Recommendations

In addition to recommendations concerning individual historic site significance, the Greenways Cultural Resources Inventory made the following general cultural resource management recommendations for the Greenways Program:

- Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or landmarked.
- Cultural properties which are owned by the city, such as Eben Fine and Central Parks, should have preservation of their historical integrity as a priority. The archaeological sites such as the Boyd Smelter, and City Dump at Scott Carpenter Park should be protected from looting. Any new trail construction or alteration, or any earth disturbing activity near these sites should be monitored by an archaeologist to insure remains are not destroyed.
- While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible.
- The Boulder Valley School District and the University of Colorado should be encouraged to maintain the field buildings at the High School (several of which are not currently used) and the CCC stonework near the High School and on CU property. Some of the stone walls and terraces at CU are in need of repair.
- Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway. The most appropriate location for historical interpretation is along Boulder Creek, Reach 7 - from Eben Fine Park to 9th Street or to Broadway. While some of the history does not have extant cultural manifestations, it can still be readily demonstrated with historical photos. This would also provide some continuity with the interpretive signs done by Boulder County for the Pioneer Trail, which extends west up Boulder Canyon from Eben Fine
  Park.

TABLE VII-1
Greenways Master Plan Update
Reach Inventory, Projects & Opportunities

Stream: **Fourmile Canyon Creek**
Reach: **1** (FCC 16)
Location: **Diagonal Hwy. to west side of Pleasantview soccer fields.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor
Bird habitat:	Very good
Aquatic habitat:	Fair
Primary (streambed):	Good
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Good
Vegetative bank stability:	Good

Other conditions:

- Trail runs along south side of creek and wetlands.
- Minor drainage issue under 47th St. / Flood water overtops 47th St. frequently.
- Channel is choked with fallen debris from trees.

Opportunities:

Transportation/Recreation:

- Complete trail connection and underpass under Diagonal and RR tracks.

Flood management:

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek Master Plan.
- Increase flood capacity under 47th St. to drain overbank flooding south of creek.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

Habitat protection: P-32, 33 + weeds

- Preserve and enhance high quality bird habitat.
- Control non-native vegetation (Remove Russian olives and other weedy species).

Water quality:

- Protect existing wetland at stormwater outfall at 47th St. for continued water quality treatment capacity.

Stream:	**Fourmile Canyon Creek**
Reach:	**2** (FCC 16, 15, 14)
Location:	**West of Pleasantview soccer fields to 28th St.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor to good
Bird habitat:	Poor to very good
Aquatic habitat:	Fair
Primary (streambed):	Poor to good
Secondary (channel morphology):	Fair to good
Tertiary (bank stability):	Good
Vegetative Bank Stability:	Good

Other conditions:

- Trail runs along north side of creek.
- Wide trapezoidal channel with concrete cut-off wall drops in Palo Park is highly aggraded and contains heavy sediment deposition.
- Channel is sand bottom and wide with no defined banks in certain areas.
- Sediment dredged from the low flow crossing is stockpiled in the adjacent wetland to the east.
- Some flood capacity may be lost due to sedimentation in channel.
- Good signs of vegetative succession with heavy hydrophytic vegetation. Weeds are dominating on deposited sediment areas.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek Master Plan.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Create low flow meandering creek and lower terrace wetland/riparian zones between 28th and 30th St.

Habitat protection: R-43 + weeds

- Enhance riparian area in Open Space easement where bird habitat quality is very good by planting native vegetation along impacted channel and managing weeds.
- Monitor for weeds and sediment problems downstream of 30th St.
- Improve habitat quality with flood capacity improvements.

Water quality: WQ-41, 42

- Restore disturbed areas along the banks and improve stream bank stability using bio-engineered methods.
- Construct BMPs to actively manage sediment downstream of 28th Street.
- Incorporate BMP's at development west of 26th Street to treat storm sewer outfalls and parking lot runoff.

Stream: **Fourmile Canyon Creek**
Reach: **3** (FCC 12, 11, 09, 07)
Location: **28th St. to 19th St.**

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Very poor to good
Bird habitat:	Poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair to good
Secondary (channel morphology):	Poor to fair
Tertiary (bank stability):	Good
Vegetative Bank Stability:	Fair to good

Other conditions:

- No paved trail. Social trail exists along the north side of creek from 28th to 26th St.
- Lots of bank sloughing and severe bank erosion along some areas in the Elks property and Githens Acres.
- Lots of trash and debris in creek along entire route.
- Banks stabilized with rock walls, concrete walls, and concrete rubble.

Opportunities:

Transportation/Recreation:

- Complete trail connections according to the North Boulder Subcommunity Plan.
- Manage access to and use of the riparian areas and creeks within Elks Park.
- Complete connection from 26th St. to 28th St. (Locate trail out of riparian area and north of creek), and from Fourmile Creek to Wonderland Creek.
- Construct soft-surface pedestrian only path between Garnet Ln. and 19th St.
- Re-evaluate multi-use path from 19th to Garnet Ln. and between Garnet Ln. and 26th. St.
- Construct trail underpass at 19th St. and combine a new bridge and culvert at 26th St. with a trail underpass.

Flood management:

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek Master Plan.
- Excavate and grade overbank and expand riparian and buffer areas.
- Consider passive flood management in parts of the reach - especially in the Elks Park.
- Eliminate driveway crossing near Sumac Ave.
- Improve capacity at 19th and 26th St. culverts.
- Eliminate spill flow to Wonderland Creek.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-28, 29, 30, 31 + weeds;

- Protect high quality vegetation structure and enhance wildlife and native plant habitat quality.
- Explore increasing in-stream flow.
- Enhance understory and ground cover with native plantings.
- Improve and expand quality of riparian buffer and manage weeds, exotics, and dumping through homeowner education.

Water quality:

- Remove concrete and other bank structures and revegetate banks where needed.

Cultural resources:

5BL6632 - Farmers Ditch bisects the creek at Elks Park.

NOTE - 4 aerial crossings of the creek by pipes carrying water from 5BL3813, The Silver Lake Ditch. These are feeders from a lateral of the ditch, and while the Silver Lake Ditch is significant, feeder ditches are not considered significant elements of the ditch. These are between 19th and 26th streets.

NOTE - A variety of creek bank treatments are present between 19th and 26th streets, including stacked cobbles, stones in cement, and concrete. These bank treatments are only in a few places, and none appear to be very old.

Stream:	**Fourmile Canyon Creek**
Reach:	**4** (FCC 07, 05, 04)
Location:	**19th St. to west side of Boulder Valley Meadows Park (13th St.)**

Habitat conditions:

Vegetation structure:	Very good
Native plant habitat:	Poor to good
Bird habitat:	Poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Good
Vegetative Bank Stability:	Fair to Good

Other conditions:

- No trail exists
- The creek is getting considerable use with lots of trash, human waste, and debris along the creek.

Opportunities:

Transportation/Recreation:

- Off-street trail connections from 19th St. to Broadway.
- Locate trail near Violet and outside of riparian area.
- Construct trail between Violet and 19th St. in the future neighborhood park site.
- Construct trail underpasses at Violet Ave., Upland Ave., and 19th St.

Flood management:

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek Master Plan.
- Excavate and grade overbank in park and expand riparian and buffer areas.
- Eliminate spill flow to Wonderland Creek.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-27 + weeds

- Enhance wildlife habitat quality through weed management and native plantings.
- Explore opportunities for enhancing riparian area through park development.
- Remove and revegetate social trails.

Water quality: WQ-40

- Stabilize impacted banks through biostabilization.
- Explore opportunity for water quality best management practice and flood mitigation in park.

Stream:	**Fourmile Canyon Creek**
Reach:	**5** (FCC 03, 01)
Location:	**West side of Boulder Valley Meadows Park to Open Space**

Habitat conditions:

Vegetation structure:	Poor to good
Native plant habitat:	Good to very good
Bird habitat:	Good
Aquatic habitat:	Poor
Primary (streambed):	Fair (to Broadway)
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to good

Other conditions:

- Trail runs along south side of creek west of Broadway.
- Channel is very straight with constructed drop/pool structures.
- Sediment and cobble collect in pools.
- Low water crossing problem at the Broadway underpass.

Opportunities:

Transportation/Recreation:

- Complete trail connection to North Boulder Foothills Park and the Foothills Trail.
- Locate trail outside of riparian area.
- Complete trail from 13th St.

Flood management:

- Mitigate flood hazards and drainage issues according to the Fourmile Canyon Creek Master Plan.
- Construct new underpass at Broadway for conveyance capacity and trail connection.
- Capture and direct floodwater to creek near Open Space.
- Excavate and grade overbank and expand riparian and buffer areas.
- Eliminate spill flow to Wonderland Creek.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: weeds

- Enhance habitat quality through weed management and native plantings. Closely monitor the success of vegetation/plantings.
- Explore opportunities to widen riparian areas through redevelopment.

Water quality: WQ-78

- Construct BMPs with new development to manage sediment loads.
- Maintain pools regularly to manage sediment.
- Provide BMPs at major outfalls when feasible.

Cultural resources:

5BL3813 - Silver Lake Ditch crosses the creek via an aerial pipe.

Stream:	**Wonderland Creek**
Reach:	**1** (WC 16)
Location:	**North Goose Creek to Valmont Rd.**

Habitat conditions:

Vegetation structure:	Poor
Native plant habitat:	Poor
Bird habitat:	Poor
Aquatic habitat:	Poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair where channel exists
Vegetative bank stability:	Poor where channel exists

Other conditions:

- New creek channel and trail are under construction (summer 2001).

Opportunities:

Transportation/Recreation:

- Provide connection to future trail to 63rd St. and Gunbarrel.
- Provide connection through Valmont park to North Goose Creek.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Construct new channel between Goose Creek and Valmont Rd.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection/Water quality: R-51; D-3

- Recreate aquatic habitat during channel construction.

Stream: **Wonderland Creek**
Reach: **2** (WC 16, 15, 14, 13)
Location: **Valmont Rd. to Foothills Parkway**

Habitat conditions:

Vegetation structure:	Poor to good
Native plant habitat:	Poor to excellent
Bird habitat:	Very poor to poor
Aquatic habitat:	Poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor to Fair

Other conditions:

- Trail exists.
- Channel ends at Boulder and Lefthand ditch. A large drop/pool is to be constructed here.

Opportunities:

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Complete new channel and drop/pool upstream of Valmont Rd.
- Open underpass under Valmont Rd. with channel construction.
- Capacity improvements along existing drainageway.
- Excavate and grade overbank and expand riparian and buffer areas.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-7 + weeds

- Manage weeds in Noble Park and Christiensen Park.
- Widen riparian area in Christensen Park and limit mowing.

Water quality: R-8

- Preserve existing wetland bottom channel for water quality benefits.
- Improve water quality of pond at Noble Park.

Stream:	**Wonderland Creek**	
Reach:	**3**	(WC 13, 12, 11, 10, 9)
Location:	**Foothills Pkwy. to 28th St.**	

Habitat conditions:

Vegetation structure:	Poor to very good (mostly good)
Native plant habitat:	Poor to excellent
Bird habitat:	Very poor to poor
Aquatic habitat:	Poor to fair
Primary (streambed):	Mostly fair, some poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Mostly fair, some good

Other Conditions:

- Creek is piped along 28th Street.

Opportunities:

Transportation/Recreation:

- Construct underpass under Diagonal for flood management and trail connection.
- Construct new underpasses at 28th St., 30th & the Diagonal, 34th St. and at Iris for flood management and trail connection.
- Construct trail from 30th St. to 47th St. Route undetermined, but to be located outside the wetland area.
- Provide connection to Howard Heuston Park.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Capacity improvements along existing drainageway between 34th St. and the Diagonal.
- Excavate and grade overbank and expand riparian and buffer areas.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Improve capacity at the Diagonal Hwy., Iris, and 28th St. culverts.
- Eliminate ditch capture

Habitat protection: P&R-9, 10 + weeds; P-11; R-52

- Work with landowners to improve habitat conditions by controlling exotic weed species, removing Russian olives and thistle, and limiting mowing.
- Control reed canary grass infestation downstream of 34th St. and manage for native vegetation.
- Preserve wetland upstream of foothills.
- Widen riparian area by defining mowing edge.
- Control grade of underpass under the Diagonal to minimize drainage of upstream wetlands.
- Widen riparian area upstream of Iris.

Water quality: WQ-4, 58, 59, 79; D-2

- Improve water quality through best management practices and bioengineering.
- Provide a BMP near the Boulder Bank.
- Daylight creek along the east side of 28th St. and provide a BMP behind the existing parking lot.
- Remove of soften (bury and re-vegetate) drops and concrete north of Kalmia. Restore to a more natural condition to enhance water quality.
- Explore opportunity for outfall treatment at 28th Street.

Stream: **Wonderland Creek**
Reach: **4** (WC 09, 08, 07, 06)
Location: **28th St. to 26th St.**

Habitat conditions:

Vegetation structure:	Very poor to good
Native plant habitat:	Poor to good
Bird habitat:	Very poor to good
Aquatic habitat:	Poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor to fair (Concrete wall trickle channel.)

Other conditions:

- No trail exists

Opportunities:

Transportation/Recreation:

- Install a box culvert under 28th St. with a trail connection.
- Construct trail connection according to the North Boulder Subcommunity Plan.
- Provide trail connection between Wonderland and Fourmile Canyon Creek through the Elks property.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

Habitat protection: R-12

- Improve riparian habitat by planting native trees and shrubs

Water quality:

- Remove concrete from channel and replace with targeted structural improvements and bioengineering for bank stabilization.

Cultural resources:

5BL6632 - Farmers Ditch runs east along Norwood Ave., then north along the west side of 26th St., then crosses 26th, and runs northeast. The ditch is in a concrete channel here.

Stream: **Wonderland Creek**
Reach: **5** (WC 06, 05)
Location: **26th St. to west side of Centennial Middle School**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Good
Bird habitat:	Good to very good
Aquatic habitat:	Fair
Primary (streambed):	Poor to fair
Secondary (channel morphology):	Fair to poor
Tertiary (bank stability):	Fair to good
Vegetative bank stability:	Fair to good

Other conditions:

- No trail exists
- No channel through the school property.

Opportunities:

Transportation/Recreation:

- Construct trail connection along north and east side of school.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-13 + weeds

- Control exotic species and reduce mowing in buffer area through homeowner education.
- Promote native revegetation of woody species along drainage area.
- Protect and enhance high quality wetlands in Pampas Ct.

Water quality: D-1

- Explore daylighting creek north of Centennial field.

Cultural resources:

5BL6632 - Farmers Ditch runs east along Norwood Ave., then north along the west side of 26th St., then crosses 26th, and runs northeast. The ditch is in a concrete channel here.

Stream: **Wonderland Creek**
Reach: **6** (WC 04, 03, 02)
Location: **West side of Centennial Middle School to 15th St.**

Habitat conditions:

Vegetation structure:	Poor to good
Native plant habitat:	Poor to good
Bird habitat:	Poor to good
Aquatic habitat:	Fair
Primary (streambed):	Poor to good
Secondary (channel morphology):	Fair to poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to good

Other conditions:

- No trail exists.
- Unconfined channel.
- Subdivisions and new house construction are having an impact on the condition of the habitat.
- Fencing, water diversions, and mowing are also causing an impact.

Opportunities:

Transportation/Recreation:

- Construct trail between Garnet and 19th St, and between Garnet and Poplar.
- Re-evaluate off-street trail opportunities considering North Boulder Subcommunity Plan.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Consider passive flood management.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Re-establish channel near 19th St.

Habitat protection: P&R-15 + weeds

- Improve native plant habitat quality and vegetative structure.
- Control weeds and exotics (especially reed canary grass and knapweed), and dumping of yard waste through homeowner education.

Water quality: WQ-6

- Explore opportunities for BMPs at 19th St. outfalls.
- Improve stream bed characteristics at upstream end of this reach by providing appropriate substrate and riffles.
- Preserve and enhance meandering low-flow channel.
- Use vegetation to maintain bank stability in downcut section.
- Remove cross basin transfer in pipe to Four Mile Creek at 19th St.
- Evaluate potential for re-colonization downstream of 19th St.

Cultural resources:

NOTE - A house foundation is present just east of 19th St.at Redwood Ave. This appears to be post World War II, thus too young to be a cultural resource.

Stream:	**Wonderland Creek**	
Reach:	**7**	(WC 01)
Location:	**15th St. to Broadway**	

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor
Bird habitat:	Poor
Aquatic habitat:	
Primary (streambed):	Good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Good
Vegetative bank stability:	Good

Other conditions:

- No trail exists.
- City drainage easement along the channel. Channel is concrete wall with a trickle channel. Easement is maintained by the homeowner's association.

Opportunities:

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection:

- Improve native plant habitat and vegetative structure.
- Work with homeowners to widen and enhance riparian area through revegetation of native plants and limiting mowing in buffer area.

Water quality: WQ-5

- Provide BMPs near 15th St.

Stream:		**Wonderland Creek**
Reach:	**8**	(WC01)
Location:	**West of Broadway**	

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor
Bird habitat:	Poor
Aquatic habitat:	
Primary (streambed):	Good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Good
Vegetative bank stability:	Good

Other conditions:

- Trail connects from Broadway to Broadway underpass.
- Managed as open space by the Open Space Department.

Opportunities:

Habitat protection: P-14

- Follow management guidelines as specified in the Open Space Area Management Plan.

Cultural resources:

5BL3814 - Wonderland Lake

5BL3815 - Degge Fish Rearing Complex, both on Open Space.

Stream:	**Goose Creek**
Reach:	**1**
Location:	**North Goose Creek from Pearl Pkwy. to Foothills Pkwy.**

Habitat conditions:

Vegetation structure:	Not rated
Native plant habitat:	Not rated
Bird habitat:	Not rated
Aquatic habitat:	Not rated

Other conditions:

- The creek in this location is a wide, dry, grassed-lined trapezoidal channel. There is very little diversity of vegetation in this reach. The Kline water rights underdrain dewaters most of the creek in this area.

Opportunities:

Transportation/Recreation:

- Construct trail underpass under Foothills Pkwy.
- Construct trail along North Goose Creek between Foothills Pkwy and existing trail near City Yards and provide connections to Valmont City Park.

Flood management:

- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: R-38, R-39

- Restore North Goose Creek channel as a functional wetland with native plantings - possibly through mitigation banking.
- Develop pilot restoration project below confluence of Wonderland and North Goose Creek. Remove structured channel and restore wetlands using bioengineering approaches.

Water quality:

- Investigate opportunity to purchase water rights to establish base flow in North Goose Creek.

Stream:	**Goose Creek**
Reach:	**2** (GC 16, 15, 14, 13)
Location:	**South Goose Creek from Pearl Pkwy. to Foothills Pkwy.**

Habitat conditions:

Vegetation structure:	Very poor
Native plant habitat:	Poor to very good
Bird habitat:	Very poor to good
Aquatic habitat:	Poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor

Other conditions:

- Previous improvements used rock bank stabilization along narrow trickle channel.
- Outfall with red precipitate at intersection of Boulder and Goose Creek paths.

Opportunities:

Transportation/Recreation:

- Construct new trail along one side of the channel.
- Construct underpasses at northbound offramp of Foothills Pkwy, 47th St., 48th St., and 49th St.& Pearl Pkwy.

Flood management:

- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: R-41&42; P-40

- Improve wetland habitat conditions.
- Restore wider wetland habitat within trapezoidal channel - possibly through mitigation banking.
- Consider pilot restoration project in conjunction with Pearl Pkwy. improvements.

Water quality: WQ-55, 56, 75

- Provide BMPs for outfalls from City Yards and along Pearl Parkway.
- Restore aquatic habitat quality by removing rock drops and structural channel and replacing with bioengineered approaches.
- Improve stream bed and channel morphology characteristics.
- Remove barriers to fish movement, especially between outlet of Goose Creek and the pond connecting to Boulder Creek.
- Improve water quality treatment functions of pond at junction of Wonderland and North Goose Creeks.

Stream: **Goose Creek**
Reach: **3** (GC 09, 08)
Location: **Foothills Pkwy. to RR**

Habitat conditions:

Vegetation structure:	Very poor to poor
Native plant habitat:	Good to excellent
Bird habitat:	Poor
Aquatic habitat:	Fair to poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Good

Other conditions:

- Trail exists.

Opportunities:

Transportation/Recreation:

- Improve connections to business park.

Flood management:

- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.

- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-37 + weeds

- Maintain and improve high quality native plant habitat. Improve vegetation structure by planting more native trees and shrubs.
- Manage weeds and monitor vegetation to protect good native plant habitat.
- Inventory for Preble's meadow jumping mouse with any future improvements.

Water quality: WQ-74

- Provide water quality treatment features at storm water outfalls.
- Replace drop structure with structure which allows fish movement.

Cultural resources:

5BL5820 - Boulder & Left Hand Ditch

5BL6879 - North Boulder Farmers Ditch - These two ditches are routed over the Goose Creek drainage and through the Foothills Parkway, flowing in from the southwest and curving to the northeast.

NOTE - There are two pieces of old agricultural equipment on the south side of the drainage, a manure spreader and a hay rake. The machinery belongs to W.W. Reynolds, owner of the property along Pearl St. The machinery will probably not be left here indefinitely.

Stream: **Goose Creek**
Reach: **4** (GC 08, 07)
Location: **RR to 28th St.**

Habitat conditions:

Vegetation structure:	Very poor to poor
Native plant habitat:	Poor to excellent
Bird habitat:	Poor
Aquatic habitat:	Fair to poor
Primary (streambed):	Fair to poor
Secondary (channel morphology):	Fair to poor
Tertiary (bank stability):	Fair

Other conditions:

- Trail exists up to 30th St.
- Goose Creek channel improvements from 30th St. to 28th St. are nearing completion (summer 2001). Trail connections, flood improvements, and channel creation are included in the project.
- Constructed channel is not conducive to supporting aquatic communities.

Opportunities:

Transportation/Recreation:

- Complete connections from 30th St. to 28th St. according to Goose Creek Improvements Plan.
- Provide connections to 29th St & businesses east of 30th St and to 30th St.

Flood management:

- Complete new channel from 30th St. to 28th.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: weeds

- Improve habitat quality from 30th St. to 28th St. by restoring channel and planting native vegetation.
- Manage weeds.

Water quality: WQ-63

- Improve water quality function from 30th St. to 28th St. with new channel construction.
- Provide water quality treatment feature at 30th St. for outfalls.

Cultural resources:

5BL400 - Colorado & Southern Railroad - The railroad crosses Goose Creek, going north-south, at the Reach 3/Reach 4 line. The railroad is elevated above the creek.

Stream:	**Goose Creek**
Reach:	**5** (GC 05, 04)
Location:	**28th St. to Folsom St.**

Habitat conditions:

Vegetation structure:	Very good
Native plant habitat:	Poor
Bird habitat:	Poor
Aquatic habitat:	Fair
Primary (streambed):	Fair to good
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to good

Other conditions:

- No trail exists.
- No channel exists for much of the reach.
- See Goose Creek Channel Improvements Plan.

Opportunities:

Transportation/Recreation:

- Construct trail connections and underpass according to the Goose Creek Channel Improvements Plan.
- Construct underpass at Folsom St. for flood mitigation and trail connection.

Flood management:

- Construct flood improvements according to the Goose Creek Channel Improvements Plan.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Construct culvert and trail connection under 28th St.

Water quality: WQ-62

- Provide BMPs upstream of 28th St. in conjunction with Goose Creek Channel Improvements.
- Replace grade control structure in trailer park which blocks fish movement.

Cultural resources:

5BL859 - Boulder & White Rock Ditch - Goose Creek is channeled into the Boulder & White Rock Ditch just west of 28th St.

Stream: **Goose Creek**
Reach: **6** (GC 03, 01)
Location: **Folsom St. to 13th St.**

Habitat conditions:

Vegetation structure:	Poor to good
Native plant habitat:	Poor
Bird habitat:	Poor
Aquatic habitat:	
Primary (streambed):	Poor to good
Secondary (channel morphology):	Poor to fair
Tertiary (bank stability):	Fair to poor
Vegetative bank stability:	Fair to poor

Other conditions:

- Banks are extremely unstable between 19th St. and Folsom.
- Drop structure at Folsom creates fish barrier.

Opportunities:

Transportation/Recreation:

- Provide underpass at Folsom.

Flood management:

- Mitigate flood hazards and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-36 + weeds; R-53 + weeds

- Enhance quality of the vegetation structure and bird habitat.
- Use homeowner education to enhance vegetation and control weeds.

Water Quality: WQ-60, 61; D-4, 5

- Use bioengineering approaches to enhance vegetative bank stability.
- Provide water quality treatment features for outfalls along Edgewood Drive.
- Evaluate potential to daylight creek from 13th to 19th Streets.
- Improve riparian habitat to serve as BMP for storm sewer outfalls along reach.
- Redesign drop structure at Folsom to allow fish passage.

Stream:	**Elmer's Two Mile Creek**
Reach:	**1** (ETC 05, 04, 03, 02, 01)
Location:	**Goose Creek to Parkside Park**

Habitat conditions:

Vegetation structure:	Very poor to good
Native plant habitat:	Very poor to good
Bird habitat:	Very poor to poor
Aquatic habitat:	Poor
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor

Other conditions:

- No trail exists.
- Weedy understory and overstory. Frequent mowing in buffer area has limited habitat quality.
- Upstream of Kalmia, the creek is constructed of concrete and gabions with no natural features. Downstream of Glenwood, the concrete is gone and the vegetation spreads out to make a more natural area.

Opportunities:

Transportation/Recreation:

- Construct off-street trail from Parkside Park to Goose Creek.
- Construct underpasses under Valmont Rd., 26th St., Iris Ave, and Glenwood in conjunction with flood improvements.

Flood management:

- Flood mitigation and capacity improvements along channel south of park and north of Valmont.
- Improve flood conveyance underpass at Glenwood.
- Construct channel between Goose Creek and Valmont Rd. to mitigate flood hazards.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Construct ditch flume at Boulder and Whiterock Ditch.

Habitat protection: R-44

- Enhance riparian area through Elmer's Park and Parkside Park.
- Modify creek to have more natural gradient where possible - combine with flood and trail improvements.
- Remove concrete along the channel where possible and restore to a more natural condition.
- Discontinue ditch capture in mobile home park and remove concrete channel.

Water quality: WQ-52, 53, 54, 72, 73, 80

- Provide BMPs adjacent to Kmart and other parking areas adjacent to creek (See Elmer's Park master plan).
- Improve habitat at Elmer's Park with vegetative bank stabilization approaches in low flow channel.
- Provide BMP at storm sewer outlet north of Glenwood and at 26th St.
- Remove concrete from Elmer's Park down to Glenwood and restore creek banks using biostabilization.

Stream: **Boulder Creek**
Reach: **1**
Location: **63rd St. to Goose Creek**

Habitat conditions:

Vegetation structure: No Data
Native plant habitat:
Bird habitat:
Aquatic habitat:
Primary (streambed):
Secondary (channel morphology):
Tertiary (bank stability):
Vegetative Bank Stability:

Other conditions:

- Trail exists.
- Concrete revetments on the right bank are failing and are undercut. There is a concrete drop structure with a concrete block jutting out of the creek.
- The vegetation is dominated by exotics. Linear cover by sandbar willow along the creek could provide good cover for Preble's meadow jumping mouse.

Opportunities:

Transportation/Recreation:

- Provide a trail connection to Gunbarrel and connection to Valmont City Park.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection:

- Protect and enhance high quality habitat in Open Space.
- Manage weeds and replant with native vegetation.
- Control illegal camping in area.

Water quality: WQ-39

- Implement BMPs for the outfall from the office use at 55th St. and Boulder Creek.
- Remove failed and undercut concrete bank protection and replace with bioengineering approaches.
- Remove concrete block from drop/pool.

Stream: **Boulder Creek**
Reach: **2** (BC 51, 50, 49, 48, 47)
Location: **Goose Creek to Foothills Pkwy.**

Habitat conditions:

Vegetation structure:	Good to Very Good
Native plant habitat:	Poor to good
Bird habitat:	Poor to good
Aquatic habitat:	Fair to good
Primary (streambed):	Good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Fair to good

Other conditions:

- Trail exists.
- Wetlands adjacent to Pearl St. Business Park have Ute ladies` tresses orchid.
- Cottonwood Grove is dominated by exotics, primarily crack and golden osier willows.
- Creek has mainly riffles.
- Natural channel processes taking place downstream. Erosion, channel bars, point bars, cross-overs. No real drops, but pools are present at fallen trees.

Opportunities:

Transportation/Recreation:

- Provide trail access from Arapahoe Ave. on 48th St. to the Boulder Creek trail minimizing impacts to Boulder Creek.
- Manage social trail system. Restrict soft trail use by closing and revegetating nondesignated social trails.

Flood management:

- Widen drainage swales from Arapahoe Ave. to allow more drainage collection and enhance wetlands.
- Improve levee behind Syntex property.
- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-47, 22 + weeds; P-26 + weeds

- Widen and revegetate riparian corridor where feasible.
- Protect and enhance wet meadow and conveyance zone on property east of Foothills Pkwy.
- Protect and enhance Cottonwood Grove.
- Control weeds and replant with natives.
- Remove concrete debris.
- Work with landowner north of the creek to protect and enhance existing *Spiranthes diluvialis* population.

Water quality: WQ-34, 35, 36, 37, 38, 49, 57

- Implement BMPs as part of new development at the property at Arapahoe and Foothills Pkwy., in conjunction with the Syntex levee improvements, and at the outfall from Pearl St. Business Park.
- Opportunity for stream restoration near RR bridge.
- Protect good quality aquatic habitat in this reach.
- Improve water quality treatment functions of pond between outlet of Goose Creek and the pond connecting to Boulder Creek.

Cultural resources:

5BL400 - Colorado & Southern Railroad - The railroad crosses Boulder Creek, running northwest-southeast.

Stream:	**Boulder Creek**	
Reach:	**3**	(BC 45)
Location:	**Foothills Pkwy. to Arapahoe Rd.**	

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Very poor
Bird habitat:	Poor
Aquatic habitat:	Fair
Primary (streambed):	Good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to good

Other conditions:

- Trail exists.
- Channel banks are relatively steep, but vegetated with rootwads and moss. Many access points.
- Stream corridor gets very narrow just upstream of Foothills Parkway. Concrete rubble and other debris in the creek. Non-native species should be selected for removal over native species. Exotic vegetation dominates canopy, subcanopy, and herbaceous groundcover.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection:

- Control weeds.
- Enhance and widen riparian area with native plantings.
- Manage trampling of streambank by revegetating impacted sections and by managing access points. Establish localized boater access to limit bank erosion near Jose Muldoon's.
- Clean up trash.

Water quality WQ-33

- Provide a boat ramp at Jose Muldoons to decrease erosion.
- Improve aquatic habitat quality through bank re-vegetation.

Stream:	**Boulder Creek**	
Reach:	**4**	(BC 42, 39, 37)
Location:	**Arapahoe Rd. to 30th St.**	

Habitat conditions:

Vegetation structure:	Very good
Native plant habitat:	Very poor
Bird habitat:	Poor to very good
Aquatic habitat:	Poor to very good
Primary (streambed):	Good (with one fair reach (BC42)
Secondary (channel morphology):	Good (with one fair reach (BC42)
Tertiary (bank stability):	Fair
Vegetative bank stability:	Good

Other conditions:

- Trail exists.
- Lots of bank erosion and trampling from access. Cobble deposit under the 30th St. bridge and downstream. Rock walls, concrete rubble, trash, constructed drops, debris in the creek.
- Sump pump for dewatering the path is discharging rusty water to the creek. Non-native species should be selected for removal over native species.
- Vegetation along this reach is dominated by exotics. The overstory is entirely crack willow with almost no shrub canopy.

Opportunities:

Transportation/Recreation:

- Provide connection to CU family housing on the east side.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-46 + weeds

- Work with CU to protect and enhance native plant and bird habitat quality at the CU Research Park.
- Control weeds and exotics.
- Close social trails in riparian area and revegetate.
- Remove trash and concrete rubble.

Water quality: WQ-29,30,31,32

- Protect and enhance complex channel structure.
- Reduce erosion through biostabilization.
- Fix trail drainage issue under Arapahoe Ave. (see conditions above)
- Work with CU to implement BMPs at the CU Research Park.
- Work with CU to install BMP at 30th Street storm sewer outfall to treat mall runoff.

Stream: **Boulder Creek**
Reach: **5** (BC 34, 32, 30)
Location: **30th St. to Folsom St.**

Stream: **Boulder Creek**
Reach: **5** (BC 34, 32, 30)
Location: **30th St. to Folsom St.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Very poor to poor
Bird habitat:	Very poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair to good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to good

Other conditions:

- Trail exists.
- The creek is very confined near the hotel tennis courts and the Gold Run condos. The buildings are built into the creek banks. The drop structure in this location is being undercut. The access for cleaning the head gate is very eroded.
- Lots of trash, concrete rubble, curb stops, and constructed drops.
- Stream bottom is fully grouted under the 28th St. bridge.
- Lots of erosion and trampling from social access points.
- Sedimentation under the 30th St. bridge.
- The vegetation is primarily exotic, and is limited to a narrow band of trees.

Opportunities:

Transportation/Recreation

- Improve trail connection between Boulder Creek trail, the Village shopping Center, and Crossroads Mall along 28th St.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: weeds

- Use homeowner education to: Control weeds (Canada thistle); limit mowing in buffer areas; introduce native plantings in buffer areas; and limit access point to the creek to preserve bank stability.
- Enhance native vegetation.
- Soften rock structures and drops in the creek to enhance aquatic habitat.
- Limit further impacts to streambanks and riparian area through the hotel site.
- Close and reclaim social trail along the creek bank.

Water Quality: WQ-66, 67

- Implement BMPs at the 30th St. and 28th St. outfalls.
- Improve instream cover between 28th St. and 30th St.
- Remove drops which act as barriers to fish movement.
- Provide a swale as a BMP along the west edge of Scott Carpenter Park.
- Pave headgate maintenance access road to reduce sedimentation.

Cultural resources:

5BL8820 - City Dump - Scott Carpenter Park is on top of a city dump dating to 1895. The dump is an archaeological site.

5BL8819 - Wellman Ditch - The Wellman Ditch diverts water from Boulder Creek at 28th St.

Stream:	**Boulder Creek**	
Reach:	**6**	(BC 28, 26, 22)
Location:	**Folsom St. to 17th St.**	

Habitat conditions:

Vegetation structure:	Poor to very good
Native plant habitat:	Very poor to good
Bird habitat:	Very poor to poor
Aquatic habitat:	Good to fair
Primary (streambed):	Good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Fair to good
Vegetative bank stability:	Good to fair

Other conditions:

- Trail exists.
- High use of the area has resulted in numerous uncontrolled access points to the creek and social trails. Severe erosion in places from bank trampling and loss of riparian vegetation.
- Lots of trash and dead animals, campsites, patios, mowed lawns.
- Vertical rock retaining walls along much of the south bank. Concrete rubble in some locations.
- Very limited native vegetation.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

Habitat protection: P-45 + weeds, R-35 + weeds

- Enhance quality of native plant and bird habitat. Revegetate impacted areas with native plantings. Replace dead cottonwoods with new plantings.
- Control access to stream and revegetate impacted stream banks.
- Manage weeds and exotics.
- Remove campsites and trash.
- Work with CU to protect and enhance riparian area and to consolidate bridges.

Water Quality: WQ-26, 28

- Work with CU to explore redesign of parking lot at CU housing complex and to relocate the recycling facility at Folsom St. - pave access road for ditch maintenance and trail access.
- Improve vegetative bank stability.
- Protect good quality aquatic habitat between 15th & 21st Streets.

Cultural Resources:

5BL8821 - Civilian Conservation Corps Stonework - Stonework done by the CCC in the 1930s is present along Boulder Creek in three places: below Folsom Field, at the end of 19th St., and by Boulder High School.

5BL3742 - residence, 1213 17th St.

5BL5929 - Watts Residence, 120 17th St.

5BL5930 - residence, 1230 17th St.

5BL3762 - Sutherland Residence, 1601 Hillside

5BL3763 - Shattuck Residence, 1605 Hillside

5BL6167 - Parce/Ronshoot/Pollard Residence, 1707 Hillside

5BL6169 - Pollard/Tisone Residence, 1709 Hillside

5BL4675 - Boulder High School, built in 1937

Stream:	**Boulder Creek**	
Reach:	**7**	(BC 19, 17, 15, 12, 9, 6, 4, 3)
Location:	**17th St. to mouth of Boulder Canyon**	

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Poor to very good
Bird habitat:	Very poor to good
Aquatic habitat:	Fair to good
Primary (streambed):	Good, (BC15, 17, 19 fair)
Secondary (channel morphology):	Good, (BC12 excellent)
Tertiary (bank stability):	Fair to good
Vegetative bank stability:	Variable

Other conditions:

- Trail exists.
- This reach of the creek has been devoted to recreational uses with resultant impacts to habitat, and possibly water quality. A kayak course is constructed in the western portion of the creek. The south bank in Eben Fine Park is entirely artificial, with quarried rock and a concrete path at the water's edge. The north bank is relatively natural.
- Numerous access points and social trails along both sides of the entire reach have caused severe impacts to the banks and riparian area. The hanging of racing gates has caused erosion and slope stability problems. Picnic tables are right on the creek banks, people and pet access is unlimited, causing severe trampling, vegetation loss, and erosion.
- Several stormwater oufall pipes drain directly into the creek with no vegetative buffering.
- Regeneration of native plants is minimal. Given current trends, there will be little canopy cover along the creek in the future unless restoration efforts are made.

Opportunities:

Transportation/Recreation:

- Establish access points/steps for hanging racing gates to protect streambank from erosion.
- Formalize access points and trails to reduce amount of trampling and erosion from creek access.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Repair failing drop structures. Increase variability of drops when they get rebuilt/maintained. (Do not impede fish passage)
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P&R-23 + weeds; P-24 + weeds

- Enhance quality of native plant and bird habitat. Protect north side of creek along kayak course from disturbance and construction.
- Replant native woody vegetation to enhance understory and overstory and widen riparian areas along entire reach.
- Enhance buffer area near kayak course. Soften structural treatments such as the south bank along the kayak course.
- Begin a tree replacement project. Revegetate south bank through Eben Fine Park.
- Work with homeowners to manage creek through native replantings and weed control, and limiting access to creek from private residences. Remove private patios and decks from the creek banks.

- Close and replant undesignated access points and social trails.
- Control weeds and exotics.

Water Quality: WQ-23, 24, 25, 27, 47, 48, 64, 65

- Implement BMPs at Broadway in conjunction with the Broadway bridge reconstruction project. Construct BMPs at 9th St. and other major outfalls where feasible.
- Protect good quality aquatic habitat which exists upstream of 9th St.
- Improve water quality of kid's fishing pond through active treatment and update educational signs
- Improve vegetative bank stability and channel conditions to enhance water quality throughout reach, especially at Eben Fine Park and kayak course.
- Work with the high school to address maintenance issues and education about creek care.
- Improve aquatic habitat at kayak course. Use upstream section of Boulder Creek as design guide. Provide more water for better quality habitat.

Cultural resources:

5BL5990 - Field Ticket Booth, Boulder High, built in 1948

5BL5991 - Field Restroom, 1948

5BL5992 - Field Concession Stand, 1948

5BL5993 - Field Grandstand/Press Box, 1948

5BL5994 - Field House, 1948

NOTE - There is an aerial crossing of Boulder Creek by a sewer pipe, between the Field House and High School.

5BL8821 - Civilian Conservation Corps Stonework - Stonework done by the CCC along Boulder Creek near Boulder High School extends into this reach.

5BL1129 - Yocom Building, 1724 Broadway

5BL6063 - Central Park

5BL5680 - Bandshell in Central Park - The Bandshell is outside the study area, but is a major feature of Central Park

5BL606 - Train in Central Park

5BL5820 - Headgate for Boulder & Left Hand Ditch

5BL6062 - Bridge over Boulder Creek at Broadway

5BL364 - Highland School - The Highland School building is outside the study area, but a bridge leading to the school parking area crosses Gregory Creek on the south side of Boulder Creek, west of 9th Street.

5BL8822 - Sand Pits - former sand pits along Boulder Creek are now the Kids Fishing Ponds. The diversion and headgate used to channel creek water into the sand pits are still used for the fishing ponds.

5BL358 - "Switzerland Trail" - Colorado & Northwestern Railroad ashlar masonry bridge abutment foundation is present along the south bank of the creek, across from the Boyd Smelter ruins.

5BL7094 - Boyd Smelter - The ruins of the Boyd Smelter are west of the Justice Center, on the north

5BL6017 - Eben Fine Park
5BL6015 - Shelter at Eben Fine Park
5BL6016 - Restroom at Eben Fine Park

NOTE - Historic residences south of the creek, fronting on Arapahoe Ave., are present from Eben Fine Park to 9th Street. The house's back yards are adjacent to the creek, but the buildings are not particularly visible from the creek and have not been listed here.

Stream: **Skunk Creek**
Reach: **1** (SC 19, 18)
Location: **Arapahoe Rd. to south end of wetlands complex**

Habitat conditions:

Vegetation structure:	Poor
Native plant habitat:	Poor to excellent
Bird habitat:	Very good to excellent
Aquatic habitat:	Fair
Primary (streambed):	Poor
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Good
Vegetative bank stability:	Fair

Other conditions:

- Trail departs from Skunk Creek and connects to the Boulder Creek trail.
- Most of the reach is located on University of Colorado property.
- The channel is constrained between vertical rock walls along portions of the creek.
- The creek is very dry in the upper portion of the reach due to water diversion to the ponds.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-25

- Preserve wetlands and buffer area between development and wetlands complex.
- Continue water diversion through wetlands.
- Explore securing base flow from upstream.
- Remove constructed channel and revegetate stream banks and riparian area.

Water Quality:

- Explore lowering the channel bottom to intercept some groundwater.
- Improve epifaunal substrate and riffle frequency.

Stream: **Skunk Creek**
Reach: **2** (SC 18, 16)
Location: **South end of wetlands complex to Wellman Canal**

Habitat conditions:

Vegetation structure:	Poor to good
Native plant habitat:	Very good to excellent
Bird habitat:	Good to very good
Aquatic habitat:	Fair to good
Primary (streambed):	Fair
Secondary (channel morphology):	Poor to fair
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor to good

Other conditions:

- Constructed trail exists.
- Creek has little base flow upstream of the pond outlet.
- North of Wellman, the creek is a wetland mitigation site, then is underground in a pipe. Large grouted rock drops are above the pipe - these are eroded and undercut.

Opportunities:

Transportation/Recreation:

- Construct bridges over Wellman Canal to connect to trail.
- Work with CU to provide public restrooms and water fountains in the CU Research Park.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-34

- Protect and enhance the wetland mitigation site at Colorado Ave.

Water Quality:

- Improve riffle frequency in creek channel.
- Remove structured rock in CU Research Park.

Cultural resources:

5BL8819 - Wellman Ditch - The Wellman Ditch flows west to east, but curves to the south where it intersects Skunk Creek, just south of Colorado Ave.

Stream:	**Skunk Creek**	
Reach:	**3**	(SC 14, 12, 10, 08)
Location:	**Wellman Canal to Baseline Rd.**	

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Very poor to good
Bird habitat:	Very poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Fair
Vegetative bank stability:	Poor to good

Other conditions:

- Lots of erosion, debris, and rubble in the creek.
- The pond under the building on 29th St. is highly eutrophic.
- Downstream of 29th St., the diversion of water at the Canyon Creek Apts. has taken water from the channel. Mowing along the creek in this area is severe.
- Severely oversteep banks in park. Severe erosion from too much access. Trash and debris in creek.
- Day care facility on 30th should be monitored for erosion problems.
- Beer bottles, concrete rubble, and a trench draining antifreeze to the creek.
- Debris and trash dams near Wellman are causing stagnant conditions.
- Flood issues at 30th St.

Opportunities:

Transportation/Recreation:

- Construct a new bike and pedestrian bridge over Wellman Canal in conjunction with flow separation and trail connection to Madison.
- Construct trail connection from E. Aurora to Baseline Rd. with a connection to Arrowwood Park.
- Construct trail underpass under 30th St.
- Open end of the US 36 culvert and provide an additional underpass at the access ramp.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: R-54 + weeds

- Restore riparian buffer and improve habitat quality.
- Use homeowner education to manage weeds and control debris in the creek.
- Install aeration devices in pond near 29th and Baseline or restore it as a wetland.
- Work with apartment owners to minimize mowing along creek banks.
- Address flow separation at Wellman Canal.
- Protect constructed wetlands.

Water Quality: WQ-43, 44, 45, 46

- Improve reach with poor streambed and channel morphology characteristics (SC08).
- Use bioengineering approaches to improve vegetative bank stability where possible.
- Regrade side slopes and stabilize banks behind Canyon Creek Apts and in park.
- Replace rubble bottoms with wetlands between 30th and Baseline.
- Consider combining two channels behind apartments to concentrate limited base flows.
- Provide BMPs for parking lots and outfalls throughout reach - especially at the Canyon Creek Apts. complex and the city park site.

Stream:	**Skunk Creek**
Reach:	**4** (SC 07, 06)
Location:	**Baseline Rd. to west of Broadway**

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Very poor to poor
Bird habitat:	Poor
Aquatic habitat:	Fair
Primary (streambed):	Poor to fair
Secondary (channel morphology):	Poor to fair
Tertiary (bank stability):	Fair to good
Vegetative bank stability:	Good

Other conditions:

- Creek is underground below Baseline, then in gabions between car wash and liquor store.
- There are several large drops that are very structural. Channel is vegetated and thalweg has developed in places.
- After the box under Moorhead, the gabions are gone and the channel and riparian area are better developed. However, creek is very confined between the apartment bldgs. and the road.

Opportunities:

Transportation/Recreation:

- Construct trail between Broadway and US 36.
- Construct trail underpasses under 27th Way and Moorhead.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: R-55

- Enhance creek through trash removal, weed control, and native plantings.

Water Quality: WQ-76, 77

- Monitor stream changes resulting from new Broadway underpass.
- Improve epifaunal substrate and riffle frequency.
- Widen buffer zone where possible.
- Provide BMP's along proposed trail adjacent to large paved areas.
- Mitigation/restoration project to include renovating gabions and maintaining vegetative bank stability.

Stream:	**Skunk Creek**
Reach:	**5** (SC 04, 03, 02, 01)
Location:	**West of Broadway to city limits**

Habitat conditions:

Vegetation structure:	Poor to very good
Native plant habitat:	Very poor to excellent
Bird habitat:	Poor to excellent (near city limits)
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Good to excellent
Tertiary (bank stability):	Mostly excellent, some poor

Other conditions:

- Creek is seasonally dry.
- Upstream of Hollyberry the creek is left wild, although there is some trash. Thick poison ivy probably keeps most people out.
- Creek is culverted and fenced under Hollyberry. Lots of trash, concrete rubble, metal, fort, construction materials.
- Creek is getting some water from Kohler Reservoir leak. Human impacts in this reach are relatively low, except for the footpath crossings and the concrete dam and bridge/spillway.
- There are many concrete pads and concrete benches.
- In Green Mountain Cemetery, mowing occurs up to creek bank and rock walls have been constructed in some places. Some erosion and headcutting are occurring downstream of the cemetery.

Opportunities:

Flood management:

- Remove social trail bridges along creek.
- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-48

- Protect and enhance high quality habitat.
- Remove fences above culvert at Hollyberry.
- Remove fencing, footbridges, retaining walls, lights and other structures within the creek.
- Use homeowner education to help control weeds and debris.
- Concentrate creek crossings at one location.

Water Quality: WQ-68, 69, 70

- Explore possibility of protecting cemetery plots from creek.
- Remove concrete flume and vegetate the residential lot downstream of cemetery.
- Improve epifaunal substrate and riffle frequency.
- Provide BMPs along proposed trail to treat runoff from NOAA parking lots.
- Explore securing a base flow from Kohler Reservoir. (Note that the reservoir contains treated drinking water, therefore chlorine levels may exceed stream standards.)
- Monitor stream response to new underpass under Broadway.

Cultural resources:

5BL3935 - Anderson Ditch - The Anderson Ditch, flowing north to southeast, intersects Skunk Creek at the northeast corner of the Green Mountain Cemetery.

5BL5954 - Green Mountain Cemetery - Skunk Creek flows north-northeast through the cemetery. The creek banks through the cemetery are lined with dry-laid stone walls, capped with concrete. The stonework is on both banks in places, and only on the west bank in places.

5BL8823 - Abandoned Irrigation Feature - A concrete dam and diversion into an 8" pipe is present along Skunk Creek, south of the Green Mountain Cemetery.

NOTE - On the southeast side of Skunk Creek are several concrete pads which used to hold circular benches, which are now gone or broken. Apparently a picnic area for NIST, this is a recent manifestation.

NOTE - Kohler Reservoir, enclosed, is near Skunk Creek near Holly Berry Lane. Built in 1954, it is yet too young to be considered a cultural resource.

Stream: **Bear Creek**
Reach: **1** (BRC 32, 30)
Location: **Boulder Creek to Foothills Pkwy.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor
Bird habitat:	Very poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Fair
Vegetative bank stability:	Fair to poor

Other conditions:

- Trail exists.
- The Open Space property is wooded and relatively wild. Trash, debris, erosion, and recent flooding are evident.

Opportunities:

Transportation/Recreation:

- Provide underpass at Arapahoe for transportation and flood.

Flood management:

- Evaluate possibility of improving berm or constructing a floodwall along Harrison Rd. to prevent spills to neighborhood.
- Protect existing high hazard flood zone on property north of Arapahoe Rd.
- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Construct a sediment collection and removal area upstream of Arapahoe.

Habitat protection: P&R-21 + weeds

- Improve vegetation structure and native plant habitat in Open Space properties.
- Weed control and trash removal to improve habitat.
- Protect and enhance wet meadow wetland habitat on property north of Arapahoe Rd.
- Monitor for potential Ute ladies' tresses orchid habitat.
- Protect Plains topminnow habitat in wetland-bottom channel upstream of Arapahoe.

Water Quality: WQ-21, 22

- Improve bank stability with vegetation enhancement.
- Provide BMPs at outfalls along Foothills Pkwy.
- Preserve existing water quality functions of wetland south of Arapahoe Rd.

Cultural resources:

5BL8819 - Wellman Ditch - The Wellman Ditch, flowing west to east, intersects Bear Canyon Creek where it flows under the Foothills Parkway, which is the boundary of Reach 1 and Reach 2. On the east side of the Foothills Parkway, north of the current Wellman Ditch, are two abandoned concrete irrigation features where water was apparently diverted from the ditch to irrigate the field to the north.

Stream:	**Bear Creek**
Reach:	**2** (BRC 29, 27, 25, 24)
Location:	**Foothills Pkwy. to Baseline Rd.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Very poor to good
Bird habitat:	Very poor to poor
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Fair, some good
Vegetative bank stability:	Fair to poor

Other conditions:

- Trail exists.
- Creek has some flow. There is evidence of recent high water.
- The path is wider than the creek in some places and is constraining the stream corridor.
- Drop structures in places are leaky and undercut.
- Upstream of Wellman, the creek is relatively wild, although the large trapezoidal shape is still predominant.
- Potential Preble's meadow jumping mouse habitat.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-19 + weeds; R-20 + weeds

- Reduce mowing in buffer area through homeowner education to provide wider riparian area. Install fencing to discourage mowing.
- Replant native plants and control exotics through homeowner education.
- Survey for Preble's meadow jumping mouse. Protect mouse habitat by encouraging native plant regeneration.
- Increase plant diversity downstream of Wellman and at Foothills Parkway.

Water Quality: WQ-19, 20

- Improve vegetative bank stability in poor reaches.
- Provide water quality BMPs at outfalls.

Cultural resources:

5BL8819 - Wellman Ditch - The Wellman Ditch, flowing west to east, intersects Bear Canyon Creek where it flows under the Foothills Parkway, which is the boundary of Reach 1 and Reach 2. On the east side of the Foothills Parkway, north of the current Wellman Ditch, are two abandoned concrete irrigation features where water was apparently diverted from the ditch to irrigate the field to the north.

Stream:	**Bear Creek**	
Reach:	**3**	(BRC 22, 20, 18)
Location:	**Baseline Rd. to Hwy. 36**	

Habitat conditions:

Vegetation structure:	Very good
Native plant habitat:	Poor to good
Bird habitat:	Very poor to good
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Poor to good
Vegetative bank stability:	Fair to poor

Other conditions:

- Trail exists.
- South side of the creek is relatively unimpacted. It's anticipated that the stream will suffer much more impact with the increased density of use planned for this area by the University.
- 100 year floodplain through CU property proposed to be developed for student housing.
- Mowing is too close to the stream bank on the north side of the creek and near the church. Downstream of church driveway, the creek is very narrowly confined.
- Lots of weeds throughout the reach.

Opportunities:

Transportation/Recreation:

- Improve connections to Greenways system as part of William's Village Master Plan.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection/Water quality: P-18, WQ-15, 16, 17, 18

- Improve vegetation structure and bank stability in association with CU development.
- Work with CU to protect wide buffer area and develop structural access points along the stream banks. (Opportunity for passive flood management in conjunction with William's Village Master Plan)
- Work with the church and CU to reduce mowing along the stream banks and restore riparian areas.
- Provide BMPs at outfalls and near Baseline Rd.

Stream:	**Bear Creek**	
Reach:	**4**	(BRC 15, 14, 12)
Location:	**Hwy. 36 to Broadway underpass**	

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Poor to good
Bird habitat:	Very poor to poor
Aquatic habitat:	Fair
Primary (streambed):	Fair to good
Secondary (channel morphology):	Mostly good, some fair
Tertiary (bank stability):	Fair to good
Vegetative bank stability:	Poor to good (improvements made after study was completed)

Other conditions:

- Trail exists.
- Beginning of reach (upstream) is constructed with large stacked boulders (plunge pool) with no vertical diversity in the channel structure.
- Portions of the reach were not adequately revegetated after the recent channel project. Lots of washed out rock walls and constructed drops. Drop structures are deteriorating in the upstream reaches.
- Downstream portion of the reach, the creek is in a flume built from vertical grouted rock walls. Trees have concrete poured on the base of the trunks and are dying. There is not much room for the creek and the path through the residential neighborhood. The creek has been severely channelized and confined between vertical rock walls with little vegetation.
- Relatively little cover in portions of the reach. Vegetation is predominately exotic with almost no native cover. Extent of the riparian area is limited by concrete and mowing.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Evaluate need for drop structure replacement before they are repaired.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: R-17 + weeds

- Improve habitat quality through vegetation enhancement.
- Increase instream habitat diversity by leaving stable blown-out drop structures.
- Manage weeds.
- Reduce mowing through park and school grounds to provide wider riparian area.
- Explore fencing to discourage trampling and excessive mowing.
- Provide homeowner education to improve creek care.
- Remove concrete from around tree trunks to prevent loss of trees.

Water quality:

- Revegetate unstable banks.
- Protect and maintain pool/riffle sequence in channel.
- Provide BMP near Moorhead.

Stream:	**Bear Creek**
Reach:	**5** (BRC 11, 9, 7, 6)
Location:	**Broadway underpass to Lehigh St.**

Habitat conditions:

Vegetation structure:	Poor
Native plant habitat:	Poor
Bird habitat:	Poor to good
Aquatic habitat:	Fair
Water quality:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Fair
Tertiary (bank stability):	Fair, some good
Vegetative bank stability:	Poor, some good

Other conditions:

- No trail exists.
- Creek passes between lanes of Table Mesa Dr.
- Many grouted rock drop structures have been constructed, but the grouted part is buried and vegetated.
- At the bridges, the creek gets very wide and deposits sand.
- Lots of trash.
- Weedy plants dominate the roadside portion of the floodplain. Exotics and garden escapees are also present.

Opportunities:

Transportation/Recreation:

- Construct a bike trail along Table Mesa Dr.
- Provide an underpass just west of Broadway to cross Table Mesa Dr.

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection:

- Enhance wetland with native plantings. Plant native tree and shrub plantings to improve cover value.
- Soften drops by burying rock structures and revegetating.
- Reduce mowing along the streambanks.

Water quality: WQ-9, 10, 11, 12, 13, 14

- Improve water quality by controlling runoff from Table Mesa Dr. Construct BMPs downstream of road crossing between lanes of Table Mesa Dr and at outfalls.
- Revegetate unstable banks.

Stream:	**Bear Creek**
Reach:	**6** (BRC 03, 01)
Location:	**Lehigh St. to city limits**

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Very good to excellent
Bird habitat:	Good
Aquatic habitat:	Fair to good
Primary (streambed):	Good
Secondary (channel morphology):	Fair to good
Tertiary (bank stability):	Good
Vegetative bank stability:	Good

Other conditions:

- Reach is situated in an unconstrained flood plain at the base of the foothills with a relatively wide riparian area.
- Creek is relatively wild. Vegetation is dominated by native species in the canopy and exotics in the herbaceous understory.
- Some trash, concrete rubble, cable TV wire across the stream.
- Lots of mowing within riparian area - especially along the church and school.
- Some erosion, vertical banks, evidence of recent high water.
- Many social trails.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to CDUMP.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

Habitat protection/Water quality: P-16

- Protect and enhance this section of the creek for habitat quality.
- Remove riprap and concrete rubble and stabilize with vegetation.
- Use homeowner education to reduce extent of mowing in the buffer areas, control weeds (Canada thistle and Bouncing Bet) and to enhance native vegetation.
- Improve base flow and aquatic habitat.

Stream:	**South Boulder Creek**	
Reach:	**1**	(SBC 4.1, 3.1)
Location:	**KOA Lake**	

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Very good to excellent
Bird habitat:	Very good
Aquatic habitat:	Fair
Primary (streambed):	Fair
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Excellent

Other conditions:

- Trail exists.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Floodplain Master Plan.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat Protection: P-49 & 50

- Preserve and enhance riparian, wetland, and aquatic habitat of South Boulder Creek.
- Avoid disturbance to Spiranthes diluvialis habitat along Boulder Creek at 61st St.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

Water quality: WQ-2, 3, 7, 8

- Treat runoff from adjacent parking lots through BMPs.

Stream: **South Boulder Creek**
Reach: **2** (SBC 19, 2.1, 1.1)
Location: **South end of KOA Lake to Arapahoe Rd.**

Habitat conditions:

Vegetation structure:	Poor to very good
Native plant habitat:	Good
Bird habitat:	Good to very good
Aquatic habitat:	Fair
Primary (streambed):	Poor to good (predominantly poor)
Secondary (channel morphology):	Poor
Tertiary (bank stability):	Excellent

Other conditions:

- Trail exists.
- 4WD access to creek.
- Leggitt Ditch head gate takes nearly all the water from the creek.
- Channel is large, trapezoidal and straight.

Opportunities:

Transportation/Recreation:

- Formalize bike connections to the Flatirons Industrial Park.

Flood management:

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Floodplain Master Plan.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.
- Manage sediment and debris under the RR crossing.

Habitat protection: P&R-1, 2 + weeds

- Maintain high quality of bird habitat by preserving and enhancing vegetation structure.
- Enhance and maintain riparian area and buffer area.
- Continue aggressive weed management program to control purple loosestrife.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

Water Quality: WQ-1

- Develop BMPs in conjunction with any new development at Arapahoe.
- Close off 4WD roads at the top of the bank.
- Negotiate for more flow downstream of ditch diversion.
- Increase the physical diversity of sections of the channel by creating pools, meanders, etc.
- Remove or redesign drop structure along business park and at bike path bridge to allow fish passage.
- Clean up abandoned cars near Arapahoe and the Leggitt Ditch.

Cultural resources:

5BL400 - Colorado & Southern Railroad - The railroad crosses South Boulder Creek, going east-west, north of Arapahoe Ave.

5BL799 - Valmont Power Plant, Leggett Inlet - A large diversion from South Boulder Creek known as the Leggett Inlet Canal, aka Hillcrest Feeder Ditch, takes water to the Leggett Reservoir, part of the Valmont Power Plant complex. The diversion is just north of Arapahoe Ave. The headgate at this diversion is shared by the Jones and Donnelly Ditch. The Jones and Donnelly Ditch splits from the Leggett Inlet to the east, out of the study area.

5BL799 - Valmont Power Plant, Leggett Outlet - A ditch carries water from Leggett Reservoir to South Boulder Creek, where it flows into Boulder Creek, and is then diverted into the Leggett Ditch by White Rocks, east of 75th St. The ditch enters South Boulder Creek

Stream:	**South Boulder Creek**
Reach:	**3** (SBC 18-09)
Location:	**Arapahoe Rd. to Baseline Rd.**

Habitat conditions:

Vegetation structure:	Good
Native plant habitat:	Very poor to very good
Bird habitat:	Poor to very good
Aquatic habitat:	Excellent
Primary (streambed):	Excellent to good
Secondary (channel morphology):	Good
Tertiary (bank stability):	Good

Other conditions:

- Off-street trail exists for some portion of the reach, and an on-road connection for the remainder.
- Stream's character changes drastically from upstream conditions.
- Lots of homeowner impacts including dams, dirt piles and horse access.

Opportunities:

Transportation/Recreation:

- The need for an off street trail will be reevaluated considering the impacts to wetland, riparian and wildlife habitat. Current habitat information supports not putting a trail west of the creek.

Flood management:

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Floodplain Master Plan.
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

Habitat protection: P-3, 4

- Improve native plant habitat through homeowner education.
- Continue to obtain conservation easements through annexations and other opportunities.
- Acquire properties east and west of the creek to protect riparian habitat.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

Water Quality:

- Protect aquatic habitat quality through conservation easements and homeowner education.
- Revegetate banks at Dimmit and redesign diversion at Dimmit to allow fish passage.

Cultural resources:

5BL8819 - Wellman Ditch - The Wellman Ditch flows from the west into South Boulder Creek, just south of the south end of Old Tale Road.

Stream: **South Boulder Creek**
Reach: **4** (SBC 08-00)
Location: **South of Baseline Rd.**

Habitat conditions:

Vegetation structure:	Good to very good
Native plant habitat:	Very good to excellent
Bird habitat:	Very good to excellent
Aquatic habitat:	
Water quality:	
Primary (streambed):	
Secondary (channel morphology):	
Tertiary (bank stability):	

Other conditions:

- Trail exists. A portion of the trail is soft-surface.

Opportunities:

Flood management:

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Floodplain Master Plan.

Habitat protection: P-5, 6 + weeds

- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

Water Quality:

- Protect and enhance excellent aquatic habitat value.
- Make enclosed ditches fully closed.
- Remove barrier to fish passage south of E. Boulder Rec. Center.
- Create better conditions for fish passage when diversion south of Arapahoe is repaired.

TABLE VII-3: SUMMARY TABLE FROM STRESS ANALYSIS

Active Threats Across Systems	ASSIMILATION CAPACITY	AESTHETICS	AQUATIC HABITAT	IN CHANNEL RECREATION	WILDLIFE HABITAT	NATIVE VEGETATION	-	-	Overall Threat Rank	Total Score
Primary home development	High	Low	Very High	Low	Very High	Very High	-	-	**Very High**	6.53
Commercial/industrial development	High	Low	Very High	-	Very High	Very High	-	-	**Very High**	6.52
Channelization of rivers or streams	High	-	Very High	-	Very High	Very High	-	-	**Very High**	6.50
Construction/Development	Medium	Medium	Very High	Medium	Very High	Very High	-	-	**Very High**	6.30
Roads or utilities	Very High	-	Very High	-	Very High	-	-	-	**Very High**	6.00
Recreational Use	Medium	Low	Very High	Low	High	High	-	-	**High**	4.13
Ditches, dikes, drainage or diversion systems	High	-	Very High	High	-	-	-	-	**High**	4.00
Flood Control	-	-	Very High	-	-	-	-	-	**High**	3.00
Invasive/alien species	-	-	-	-	-	Very High	-	-	**High**	3.00
Weed Invasion	-	-	-	-	High	-	-	-	**Medium**	1.00
Storm Sewer System (Outfalls)	-	Low	-	-	-	-	-	-	**Low**	0.03
Nutrient Loading	-	Low	-	-	-	-	-	-	**Low**	0.03
Parasites/Pathogens/Wildlife/Pets/	-	-	-	Low	-	-	-	-	**Low**	0.03
	-	-	-	-	-	-	-	-	**-**	0.00
Threat Status for Targets and Site	Very High	Low	Very High	Medium	Very High	Very High	-	-	**Very High**	

Strategies Across Systems	ASSIMILATION CAPACITY	AESTHETICS	AQUATIC HABITAT	IN CHANNEL RECREATION	WILDLIFE HABITAT	NATIVE VEGETATION	-	-	Strategy Benefit Rank	Total Score
Public Education	High	Low	Very High	Low	Very High	Very High	-	-	**Very High**	6.53
Habitat Restoration	High	-	Very High	-	Very High	Very High	-	-	**Very High**	6.50
Greenway Design Guidelines	Low	-	Very High	-	Very High	Very High	-	-	**Very High**	6.02
Habitat Preservation	High	-	Very High	-	Very High	High	-	-	**Very High**	5.50
Acquisition & Buffer Enhancement	Medium	-	-	-	Very High	Very High	-	-	**Very High**	4.60
Conservation Easement	-	-	-	-	Very High	Very High	-	-	**Very High**	4.50
Eliminate Ditch Capture	High	-	Very High	High	-	-	-	-	**High**	4.00
Weed Management	-	-	-	-	High	Very High	-	-	**High**	3.50
Structural BMP Implementation	High	Medium	Medium	-	-	-	-	-	**Medium**	1.40
Erosion Control BMP's at Construction Sites	Medium	-	Medium	Low	-	-	-	-	**Medium**	0.43
	-	-	-	-	-	-	-	-	**-**	0.00

Table VII-3, cont.

Strategies	Benefits					Feasibility			Cost	Overall
	Active Threat Abatement Rank	Persistent Stress Reduction Rank	Leverage	Overall Benefits	Overall Benefits User Override	Lead Individual/ Institution	Ease of Implementation	Overall Feasibility	Overall Cost	Overall Strategy Rank
Acquisition & Buffer Enhancement	Very High	-	Medium	Very High		Medium	Medium	Medium	Very high	High
Conservation Easement	Very High	-	High	Very High		Medium	Low	Low	High	Medium
Eliminate Ditch Capture	High	-	High	High		Low	Low	Low	Very high	Low
Erosion Control BMP's at Construction Sites	Low	-	High	Medium		Very High	High	High	Low	High
Greenway Design Guidelines	Very High	-	Very High	Very High		High	Medium	Medium	Medium	Very High
Habitat Preservation	Very High	-	Medium	Very High		Very High	High	High	Low	Very High
Habitat Restoration	Very High	-	Medium	Very High		High	Medium	Medium	High	High
Public Education	Very High	-	Very high	Very High		High	High	High	Medium	Very High
Structural BMP Implementation	Medium	-	Medium	Medium		Medium	Medium	Medium	Low	High
Weed Management	High	-	Very High	Very High		High	High	High	Very high	High

TABLE VII-4: SUMMARY TABLE FROM RANKING METHOD

	PROJECT DESCRIPTION				Overlap	SCORES	
	Preserve	Restore	BMPs	Daylight	Bonus	Project	Reach
Reach							
FC1	x				2	25	50
FC1	x				2	25	50
FC2		x	x		6	37	37
FC3	x	x			12	33	79
FC3	x	x			13	46	79
FC4	x	x	x		13	49	49
FC5			x		11	29	29
WC1		x		x	9	22	22
WC2	x	x			3	34	34
WC3	x	x			-6	15	45
WC3			x		2	7	45
WC3	x				2	7	45
WC3		x	x	x	-7	16	45
WC4		x			7	20	20
WC5	x			x	2	15	15
WC6	x	x	x		4	30	30
WC7			x		1	1	1
WC8	x				1	16	16
GC1		x			7	20	40
GC1		x			7	20	40
GC2	x	x	x		3	41	55
GC2		x			1	14	55
GC3	x	x	x		-6	30	30
GC4			x		5	23	23
GC5			x		7	7	7
GC6	x	x			3	24	48
GC6		x	x	x	3	24	48
ETC1			x		10	20	64
ETC1			x		10	10	64
ETC1		x	x		11	34	64
BC1			x		1	1	1
BC2	x	x	x		-16	9	70
BC2	x				2	15	70

	PROJECT DESCRIPTION				Overlap	SCORES	
	Preserve	Restore	BMPs	Daylight	Bonus	Project	Reach
Reach							
BC2	x	x	x		-16	30	70
BC2			x		1	16	70
BC3			x		1	1	1
BC4	x	x	x		-16	25	25
BC5			x		3	16	16
BC6		x	x		-7	9	25
BC6	x				2	15	25
BC6			x		1	1	25
BC7	x	x			-19	12	79
BC7	x		x		1	44	79
BC7			x		0	23	79
SC1	x				1	6	6
SC2	x				1	6	6
SC3		x	x		3	19	30
SC3			x		1	11	30
SC4	x		x		5	20	20
SC5	x		x		2	17	18
SC5			x		1	1	18
BCC1	x	x	x		-6	35	35
BCC2	x		x		3	21	40
BCC2		x	x		-7	19	40
BCC3	x		x		2	22	23
BCC3			x		1	1	23
BCC4		x			2	23	23
BCC5			x		1	36	36
BCC6	x				1	6	6
SBC1	x		x		2	27	27
SBC2	x	x			-7	24	54
SBC2	x	x	x		-6	30	54
SBC3	x				2	11	22
SBC3	x				2	11	22
SBC4	x				2	25	50
SBC4	x				2	25	50

VIII. Maintenance Plan

As a part of the Master Plan update, the Greenways Coordination Team reviewed the current maintenance practices within the Greenways system to develop standards and provide clarification for routine maintenance and periodic improvements of the Greenways system. Specific implementation guidelines and restoration techniques will be developed as a separate document in conjunction with an update of the Greenways Design Guidelines.

City staff representing the different work groups that maintain the Greenways System, identified and evaluated various maintenance issues in order to establish the following maintenance objectives:

- clearly defined maintenance responsibilities;
- consistent maintenance standards;
- appropriate resources for the overall system maintenance including tree maintenance and weed control;
- a formal review procedure for capital projects, and;
- a clear understanding of landowners' responsibilities.

A. Maintenance Responsibilities

The Greenways System is currently maintained by several maintenance work groups within the city. Tasks are divided by geographical location, as well as function. The responsibility of each work group is described in Section II. In an effort to clarify existing responsibilities and establish consistent levels of service a matrix of current practices was developed (Table VIII-1). The table identifies the tasks and frequency performed by each work group. A GIS map was also developed to clarify maintenance responsibilities by geographic location. This map is contained in Appendix VIII-1.

In an effort to reduce confusion regarding maintenance responsibilities, a procedure for reporting, tacking and correcting maintenance problems was established. All Greenways maintenance problems can be reported to the Street and Bikeway Maintenance hotline at 303-413-7177. The Street Maintenance staff will follow up on the problems that are within their jurisdiction and forward the other items to the appropriate work group. A database of reported maintenance problems is kept by Street Maintenance, and other groups have access to this information.

B. Consistent Maintenance Standards

Using the Current Practices matrix, maintenance practices between the different work groups were compared. Both Parks Maintenance and Street and Bikeway Maintenance are responsible for the multi-use paths along the Greenways in different locations. While the Parks staff does not currently provide 24-hour snow removal, Street and Bikeway Maintenance clears the paths of snow at less frequent intervals. It also inspects the path system and removes trash less frequently than the Parks staff.

Staff discussed establishing a maintenance standard for snow removal. While the group felt that the Greenways paths provide a recreation and transportation component, the group consensus was the standard should be set to meet the transportation objective. Parks Maintenance staff therefore agreed to provide 24-hour coverage for snow removal, and Streets and Bikeways will increase the frequency that the paths are plowed to twice each 12-hour shift. This increased level of service is shown in the matrix of Enhanced Practices (Table VIII-2). The Enhanced Practices matrix also includes more frequent inspection of the path system and an increase in trash collection from once per week to twice per week for the Street

Maintenance work group.

C. Weed Control and Habitat Maintenance

Weed control and habitat maintenance were important topics of discussion during the Master Plan update process. The Greenways system is currently maintained for transportation, recreation, and stormwater conveyance. While the focus of maintenance efforts has been on the trail system and stream stability for flood control, it is also important to maintain the Greenways for habitat and water quality. Specific activities considered for maintenance to a "habitat" standard are listed below. Changes in current maintenance practices that would enhance habitat and water quality with minimal budgetary impacts are identified with a "*".

Weed control and planting of natives
*Mowing at the right time and to the right height
*Preserving an unmowed vegetative buffer
Improving tree care
*Accelerated trimming of branches
*Managing social trails
Fencing sensitive areas
Repairing, replacing, and updating educational signs
Increasing volunteer cleanup events
Adding more pet cleanup stations
Re-vegetating trampled banks
Improving ground cover and structure of buffer vegetation
Increasing sweeping and removing swept materials
Diverting wash water away from creek
Maintaining water quality BMPs and controlling sediment
*Using bio-engineered methods for flood control maintenance
Removing dead animals from the drainageways

Based on meetings with the Greenways staff group including discussions about funding, the recommendation for habitat maintenance is to modify current maintenance practices to meet environmental objectives and to begin addressing weeds along the Greenways trail corridors. Table VIII-3 shows a Cost Summary for Weed Control that identifies the associated costs.

It was determined that additional funding required to pursue all of the maintenance activities above would be difficult to secure at this time. The recommendation for the 2002-2007 CIP is to divert 1/3 of the Greenways budget from capital projects into a weed control effort. This would be split evenly between the current funding sources for Greenways.

To focus efforts on weed patches with the intent of improving habitat quality, the staff recommendation is to direct initial weed control efforts on lands owned and managed by the city. The highest priority for weed control would be in areas of high quality habitat except for the presence of weeds. Educational programs, pamphlets, and environmental enforcement are available from other agencies and other city workgroups to encourage compliance with weed ordinances on private lands. A homeowner education program

sponsored by Greenways would also be useful for reducing the spread of weeds and ornamentals from privately owned land. Specific tasks related to weed control along the Greenways trail system include:

Retaining a weed consultant and summer crew
Purchasing equipment
Control and removal of noxious weeds
Planting of natives to discourage re-establishment of weeds

D. Forestry Maintenance

Trees along all Greenways paths are pruned to provide 7 feet of clearance above the path surface. When identified as potential safety issues, dead trees and broken, cracked, hanging, or dead branches are removed to prevent them from falling onto the path or injuring trail users. These maintenance activities are performed by different work groups depending upon the location. Streets Maintenance staff prunes trees along the entire Greenways and bikeway system except areas within city Parks or along Boulder Creek. Within park sites and along the Boulder Creek path, Parks staff performs clearance and safety pruning. The Forestry Division has a separate program for maintenance of trees in turf areas of parks and for street trees.

Except for a 7-year Tree Safety Inspection Survey of the Boulder Creek path between 9th Street and 14th Street and informal scans of the trees along the rest of the Boulder Creek path, Forestry staff does not proactively monitor public or private trees that overhang Greenways paths. Instead, the maintenance work groups only respond to complaints or requests regarding trees that overhang the paths and jeopardize public safety. Only publicly owned trees posing a potential safety concern to the bike path receive maintenance. When necessary, private property owners are notified of their responsibility to provide the necessary corrective action for privately owned trees. Trees in natural areas that are far enough away from the bike path do not receive maintenance and are left in their natural state. When trees are pruned generally only the path side is pruned, and anything over-hanging the creek is generally not included. Flood Control staff responds to tree and debris removal when they fall into the creek and restrict water flow, or on a complaint driven basis.

Increases in service level for tree maintenance have been considered. The recommended option includes a one-time initial cleanup, scanning of private trees, and formal tree safety inspections of public trees along the entire Greenways system. The standard for pruning would be improved from 3" diameter or larger to 1" diameter. In addition, a coordinated, pro-active effort with Flood Control staff would be established to identify and remove trees and branches before they fall into the creek. The initial cost associated with this increased level of service is estimated at $124,910, with on-going annual non-personnel costs of $35,754 plus one additional FTE (annual cost of $36,200 including benefits). Further increases in service level including maintaining for the health of the tree and establishing a replanting program were considered, but were cost-prohibitive.

E. Streets and Bikeway Maintenance

Within the city of Boulder there are currently 47 total miles multi-use paths, 17 miles of which are Greenways paths. The Parks and Recreation Department maintains the Boulder Creek path, which is approximately 5.5 miles long. The University of Colorado, Boulder County, and private entities maintain approximately 13 miles of the system, and the Streets and Bikeways Maintenance work group maintains the remaining 28.5 miles, which includes both Greenways and non-Greenways paths. The Streets and Bikeways Maintenance budget for maintaining these 28.5 miles of multi-use paths is currently $267,388 per year including personnel expenses. A one-time allocation of $30,000 for a truck was also received in 2001. In addition, the Transportation Division's current budget for major maintenance of bikeways is $175,000. This is utilized to replace bridges and significant sections of paths.

F. Landowners' Responsibilities

According to state and local ordinances, property owners are responsible for controlling the weeds on their land. The Greenways Program does not own property, although some land traversed by Greenways trails include city rights-of-way, Parks Department property and Open Space property. The Greenways corridors pass through various public and private lands, with non-standardized easement language or agreements about maintenance. Therefore, the responsibility for weed control is a complicated issue. In order to negotiate easements and facilitate development of the trail system, the city typically offers to maintain the trail and six-foot shoulders on each side. When the disturbance from the trail and the mowing operations lead to a localized weed infestation, weed control in the trail buffer should be performed by the city. However, if the weed infestation is large and the source is beyond the trail impact area, controlling weeds in the six-foot buffers will not be effective. Weed control is an example of an area where city-sponsored public education programs could make a significant difference in Greenways condition.

TABLE VIII-1

PATHWAYS MAINTENANCE – CURRENT PRACTICES

	FTE's	Inspections	Clean/ Trash	Sweep	Snow Removal	Trees	Mowing	Encroach-ments	Complaints	Flooding/ Underpasses
Parks Path + 6 ft Either side for Boulder Creek path only	1 FTE plus .2 seasonals & volun-teers	Formal: 2/year Some docu-mentation Informal: daily	Trash cans emptied daily Litter daily Volunteer programs	1/week with mech. broom	4 am - 6 pm or PD request 3 passes/shift ---------- Pickup truck with plow Liquid deicer	Prune: 1/yr and as-needed or by complaint Standard: clearance safety (only branches under 7') Private prop: Prune	Irrigated turf : 1/week 6 ft off path Non-irr: 1/mo during summer 72" Toro mower	Same as for mowing No edging	24 hr response time ASAP on hazards	As needed After hrs or PD request close gates Make every attempt to keep underpasses open. Remove sediment and vegetation.
Forestry Boulder Creek path only	2.8 % of 1 FTE's time	Formal: Tree Survey every 7 years only in area of Creek Festival Informal: Requests from park staff or citizens as concerns arise.	N/A	N/A	N/A	Safety prune & removal on complaint basis. Private property owners notified of their responsibility for necessary action.	N/A	N/A	Non emergency response within 3-5 work days. ASAP on hazards.	N/A
Streets And Bikeways Path + 6 ft Either side	1 FTE plus 1 seasonal	Formal: 2/year Documented Informal: 1/wk	1/week	Path: as needed Under-passes: 1/wk	24 hr shifts 2-12 hr shifts 1 pass/12 hrs ---------- Plow, liquid deicer, traction when needed	Prune: 1/yr & as needed; complaint Safety & clearance std is 7' high and limbs back to tree Private property: notify, prune	Std: < 18" high, 6 ft either side of path Irrigated turf: 1/week Non-irr: as needed, 1/mo (3 to 4 times per season)	As needed Std: if more than 1 ft into path or if safety hazard, remove No edging	24 hr response time ASAP on hazards	As needed Keep open, or close with gates Open gates ASAP Identify high priority routes to focus efforts
Open Space and Mtn Parks	0 FTE	Formal 1/yr Informal: 2/month by rangers	N/A	N/A	N/A	Prune or remove as needed as part of routine trail maintenance	1/yr as needed	N/A	24 hr response time ASAP on hazards	N/A
Utilities Bank to bank	0.5 FTE	Formal: 1/yr No doc Informal: On request or after storms	1/year and upon request Tasks: Trash in creek and sediment removal; Tree/debris removal when restricting flow or on complaint basis	N/A	N/A	Money to forestry to keep downed limbs and branches out of the creek Not an annual allocation	1/mo (4 times per season) Grass-lined drainageways and above the bank Mower with articulated mowing arm	N/A	Next working day (24 hr) ASAP on hazards	Stabilize banks as needed.

- Weed control is done through mechanical means or with herbicide application by all work groups
- Bridge Maintenance: As needed. Formal program involves flipping boards every 10 years and replacing all boards every 20 years
- Major Maintenance – annual funding of $175,000; work is prioritized by Transportation Project Management and includes concrete remove and replace, redesign or grade changes to handle flooding, etc.

TABLE VIII-2

PATHWAYS MAINTENANCE – ENHANCED WITHIN EXISTING BUDGET (7/31/2001)

	FTE's	Inspections	Clean/ Trash	Sweep	Snow Removal	Trees	Mowing	Encroach-ments	Complaints	Flooding/ Underpasses
Parks Path + 6 ft Either side for Boulder Creek path only	1 FTE plus .2 seasonals & volun-teers	Formal: 2/year Some docu-mentation Informal: daily	Trash cans emptied daily Litter daily Volunteer programs	1/week with mech. broom	[~~4 am – 6 pm~~] **Increase to 24-hour coverage**	Prune: 1/yr and as-needed or by complaint Standard: clearance safety (only branches under 7') Private prop: Prune **Accelerated trim (by "green" time)**	Irrigated turf : 1/week 6 ft off path Non-irr: 1/mo during summer **Mow at right time and height. Preserve unmowed buffer.**	Same as for mowing No edging	24 hr response time ASAP on hazards	As needed After hrs or PD request close gates Make every attempt to keep underpasses open. Remove sediment and vegetation.
Forestry Boulder Creek path only	2.8 % of 1 FTE's time	Formal: Tree Survey every [~~7 years~~] **year** only in area of Creek Festival Informal: Requests from park staff or citizens as concerns arise.	N/A	N/A	N/A	Safety prune & removal on complaint basis. Private property owners notified of their responsibility for necessary action. **Accelerated trim (by "green" time)**	N/A	N/A	Non emergency response within 3-5 work days. ASAP on hazards.	N/A
Streets And Bikeways Path + 6 ft Either side	1 FTE plus 1 seasonal **Add 1 FTE (2001 budget)**	Formal: 2/year Documented [~~Informal: 1/wk~~] **Increase informal to 2/week**	[~~1/week~~] **Increase to 2/week**	Path: as needed Under-passes: 1/wk	24 hr shifts 2-12 hr shifts [~~1 pass/12 hrs~~] **Increase to 2 passes/12 hrs** Plow, liquid deicer, traction when needed	Prune: 1/yr & as needed; complaint Safety & clearance std is 7' high and limbs back to tree Private property: notify, prune **Accelerated trim (by "green" time)**	Std: < 18" high, 6 ft either side of path Irrigated turf: 1/week Non-irr: as needed, 1/mo (3 to 4 times per season) **Mow at right time and height. Preserve unmowed buffer.**	As needed Std: if more than 1 ft into path or if safety hazard, remove No edging	24 hr response time ASAP on hazards	As needed Keep open, or close with gates **Check every 24 hrs** and open gates ASAP Identify high priority routes to focus efforts
Open Space and Mtn Parks	0 FTE	Formal 1/yr Informal: 2/month by rangers	N/A	N/A	N/A	Prune or remove as needed as part of routine trail maintenance	1/yr as needed	N/A	24 hr response time ASAP on hazards	N/A
Utilities Bank to	0.5 FTE	Formal: 1/yr No doc Informal:	1/year and upon request Tasks: Trash	N/A	N/A	Money to forestry to keep downed limbs and branches out of the creek	1/mo (4 times per season) Grass-lined	N/A	Next working day (24 hr) ASAP on hazards	**Use bioengineered methods** to stabilize banks as needed.

bank		On request or after storms	in creek and sediment removal; Tree/debris removal when restricting flow or on complaint basis			[~~Not an annual allocation~~] **Annual allocation**	drainageways and above the bank **Mow at right time and height. Preserve unmowed buffer.**	

- Weed control is done primarily through **mechanical and manual** means

Additional Programs:

- Bridge Maintenance: Increase formal program to **flipping boards every 7 years** and **replacing all boards every 14 years**

1 .

TREES (see Master Plan text)

- **Accelerated trim –** more efficient tree trimming to be done earlier in the season (by the time trees bloom)

2 .

PRESERVATION FOR HABITAT

3. RARE

DOG POLICY

4. SPECIES

OF SPECIAL CONCERN

TABLE VIII-3: COST SUMMARY FOR WEED CONTROL

Proposed Increase beyond Existing Budget		**1st year**	**Ongoing**	
Location	**Personnel**	**Costs**	**Costs**	**Function**
Weed control along paths	.25 FTE			
				Habitat
		$5,000	$2,500	Coordinate mowing
		$25,000	$0	Develop weed control plan
		$16,000	$16,000	Weed specialist
		$32,000	$32,000	Seasonal weed crew
		$2,000	$2,000	Incidentals for crew
		$85,000	$0	Large equipment
		$25,000	$10,000	Small equipment
		$30,000	$30,000	Spray
		$50,000	$25,000	Native plants / seed
		$5,000	$2,500	Water plants
		$2,000	$2,000	Monitor, report, map weeds
		$3,000	$500	Community ed / fliers
	HABITAT TOT =	$280,000	$122,500	
Total / yr if spread over 5 yrs:	**$154,000**			
				Water Quality
		$15,000	$2,000	Stake and plant mow edge

	WQ TOT =	$15,000	$2,000
Total / yr if spread over 5 yrs:	**$4,600**		

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IX. Organizational Structure and Finance

A. Greenways Program Organization

The Greenways Coordinator will be part of the Utilities organizational structure, reporting to the Utilities Project Coordinator. The Greenways Coordinator will work with an interdepartmental staff review group (the Greenways Coordination Team) representing the various objectives of the Program. The Greenways Coordination Team will be responsible for coordinating information about the Program with their board members and other city staff from their departments.

B. Long Term Funding Plan

Cost estimates for the projects and opportunities identified in Section VII are contained in Appendix VII-2. This information has been summarized in Table IX-1. These costs do not take into account the cost of design, flood studies, property acquisition or other engineering evaluations. After removing proposed improvements which would be considered under the CIPs for other departments such as Transportation and Flood Control, potential Greenways projects identified in this master plan update have an associated total construction cost of almost $16 million. At the current annual funding of $450,000 per year, with $150,000 being dedicated to habitat maintenance and additional costs associated with design, property acquisition and studies, proposed improvements could be completed over a 53-year period, assuming all of these improvements are funded solely through the Greenways budget.

In order to maximize the overlap of objectives within the Greenways Program and to coordinate projects along the Greenways, identification of projects for the 2002-2007 Greenways CIP was done as a team effort combining input from Public Works (Utilities and Transportation groups), Parks and Recreation, Water Quality and Environmental Services, and Open Space and Mountain Parks.

Transportation and flood control projects were identified from the Transportation Master Plan, the Comprehensive Drainage Utility Master Plan, and intra-departmental meetings to determine project priorities and timing. Environmental projects were identified during the Master Plan update process and were prioritized based on recent environmental studies, the overlap with other projects, and the feasibility and effectiveness of the project in meeting environmental goals. Maintenance of the Greenways system has been under review as part of the Master Plan update process. To address the identified deficiencies in habitat maintenance and weed control, the 2002-2007 Greenways CIP is specifying $150,000 to be dedicated for this purpose.

Greenways projects have been historically funded from the Transportation Fund, Flood Control Fund, and the Lottery Fund, as follows:

Transportation	-	$150,000
Flood Control	-	$150,000
Lottery Fund	-	$150,000

Increases to program funding levels were evaluated as part of the Master Plan update process, but due to city-wide budgetary constraints, no changes to the existing funding levels were made. Continued funding of the Greenways Program at $450,000 per year is anticipated.

C. Other Funding Mechanisms

Supplementary funding for Greenways projects may be available from a variety of sources. Grants may be available to accomplish stand-alone environmental projects which are currently considered under the Greenways CIP. Historic preservation grants may be available to achieve some of the management goals for cultural resources. Funding may be available from the U.S. Army Corps of Engineers for stream restoration and watershed assessments. Grant applications will be coordinated through the City Manager's Office.

X. APPENDICES

Appendix I-1: Greenways Master Plan Map
Appendix II-1: Greenways Master Plan Update Survey Executive Summary
Appendix II-2: Community and Environmental Assessment Process (August 2001)
Appendix II-3: List of Tributaries to Boulder Creek
Appendix III-1: Summary of Cultural Resources
Appendix IV-1: Parks and Open Space Managed Land Along Greenways
Appendix V-1: Tributary Greenways Guidelines for Open Space and Park Lands
Appendix VII-1: List of Transportation Changes from the May 1998 Greenways Map
Appendix VII-2: Cost Estimates for Proposed Improvements by Reach
Appendix VII-3: Description of Environmental Project
Appendix VIII-1: Maintenance Map

APPENDIX I-1

GREENWAYS MASTER PLAN MAP

APPENDIX II-1

GREENWAYS MASTER PLAN UPDATE SURVEY
EXECUTIVE SUMMARY

Appendix II-1
Greenways Master Plan Update Survey
Executive Summary

Methods

- The Greenways Master Plan Update Survey was administered by phone to a representative sample of 400 city of Boulder residents in May, 1997. The margin of error, based on the sample size of 400, is no greater than + or -5% around any percentage and 2.6 points around any mean converted to the 100 point scale.

Results

Knowledge of the Greenways Program

- About 37% of survey respondents were familiar with the Greenways Program; the other 63% had not heard of the program.

Greenways Master Plan Goals

- The four major goals of the Greenways Master Plan were rated in terms of importance. Although all of the goals were seen as important, environmental preservation, on average, was rated the most important (88 on a 100 point scale). Protection from flood hazard (83), alternate transportation (82) and recreation opportunities (80) followed in ratings.

- Respondents were asked to rate how well each of the Greenways Mater Plan's goals are being met. All of the goals received favorable ratings. The provision of recreation opportunities was judged to be the best met goal. Protection from flood hazard was perceived as the least met goal.

Use of the Greenways Trail System

- Almost half of the surveyed households reported using the trail system 26 or more times in the last 12 months. Only 10% of the households did not use the Greenways paths last year.

- The most common activities performed on the trails were biking and walking.

User Ratings of the Greenways Trail System

- Almost 50% of respondents rated the number of people using the system as "about right"; 28% felt there were too few people using the system, and 16% felt there were too many

users.

- Residents felt relatively safe on the paths from harassment and crime. There was a greater concern about collisions.

- Users rated the connectivity of the system to major household destinations. The trails were felt to have the best connections to recreation centers and the workplace or school of adult household members.

- When asked what could be done to increase the use of the Greenways trails, the most common response was to increase the number of trails, access points and connections.

- The most frequently encountered problems on the Greenways system were congestion on the trails and reckless bicyclists and roller bladers. However, about 45% of system users reported no problems on the paths.

Expansion of the Greenways Trails System

The advantages and disadvantages of expanding and accelerating the Greenways trail system were explained to respondents for their opinions on how the city should proceed.

- The construction of new paths and trails was supported by about 60% of those surveyed; 23% opposed the construction of new paths while 17% had no opinion.

- The current time frame of 15 to 20 years to complete the Greenways system was rated "about right" by 46% of the respondents, while 42% felt it was "too slow" and 4% felt it was "too fast". When asked if they would like the plan to be accelerated, 46% opposed it, 40% supported it and 14% were indifferent.

- A major expansion of the current plan which calls for connecting every major school, park, major employment center and neighborhood was supported by about half of those surveyed. One quarter opposed the idea and one quarter of respondents were undecided.

Construction of Bike Lanes and Paths

- Survey respondents overwhelmingly (79%) preferred off-street paths to on-street bike lanes. After hearing information on the advantages and disadvantages of each, about 64% suggested that the city pursue off-street bike paths as compared to their on-street counterparts.

APPENDIX II-2

CEAP INFORMATION

The Community and Environmental Assessment Process

August 2001

The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. The CEAP was instituted by City Council in 1987 and is referred to in the Boulder Revised Code (B.R.C. Section 2-1, Appendix IX, Procedure in Handling Major Capital Improvement Projects).

CEAP review consists of: a project description; a discussion of the BVCP and master plan goals that the project will address; a review of the impacts of the project in checklist form; and a description of the proposed impact mitigation measures and their associated costs.

The emphasis of the CEAP analysis at this stage is a general scoping of impacts and associated impact avoidance/mitigation strategies, in order to allow comparative impact assessment of selected major alternatives. The CEAP also provides the opportunity to balance multiple community goals through a public project by looking at a project within the context of the BVCP and master plans. The CEAP allows "fatal flaws" inherent in the concept design of a project to be discovered, thereby suggesting elimination of certain alternatives. Several outcomes of the CEAP impacts and mitigation analysis are possible:

- **No social or environmental impacts are identified;**
- **Minor social or environmental impacts are identified that can easily be mitigated;**
- **Major social or environmental impacts are identified that can easily be mitigated;**
- **Major social or environmental impacts are identified that require more detailed investigation of impacts and possible mitigation strategies; or**
- **Environmental impacts are identified that cannot be reasonably mitigated.**

Goals of the CEAP

Achieve Multiple City Goals

- ***Implementation of Boulder Valley Comprehensive Plan and Departmental Master Plans.***
- ***Recognition and integration of multiple community goals and interests in single projects.***
- ***Minimization of environmental, social, and fiscal impacts of projects.***
- ***Identification of opportunities to improve capital projects through***

project planning and review process.

- *Assure internal compliance with city policies, goals, and regulations.*

Achieve Service Efficiency

- *Minimization of impacts to other service delivery goals and master plans.*
- *Efficiency in planning and spending for capital improvements.*
- *Freedom and flexibility for project managers in the planning and implementation of projects.*

Maintain Effective Public Involvement

- *Effective management of board, Council, and public input in project planning and implementation.*

Guidelines for Identifying Projects Requiring CEAPs

For a project to go through the CEAP, it should meet at least one of the following criteria. These criteria are intended to guide the selection of projects for CEAPs during the annual CIP budgeting process.

1. ***A project or a potential alternative could have a significant impact on a environmental, social, or cultural resource.***

2. ***The project is anticipated to generate neighborhood or community controversy.***

3. ***There is more than one possible conceptual alternative that will require staff or community input in the selection.***

4. ***The project requires external review on the county (1041), state, or federal level (NEPA), then an internal city CEAP should be performed prior to submitting to the external agency.***

CEAP Review and Approval

1. The project manager develops preliminary concept plans for project alternatives (project types, locations and function designs).

2. The project manager prepares the CEAP documentation of a concept plan or concepts for major alternatives (if applicable).

3. The CEAP documentation is submitted to Planning and Development Services for development review. The project manager includes a list of people, groups or organizations that should be notified of the project.

4. The Planning Director assigns the project to a Planning Department case manager.

5. If a site review or subdivision is required for the project, the appropriate applications are submitted concurrently with the CEAP. (This does not include permits such as wetlands, floodplain, or building permits which are obtained at a later phase.)

6. The Planning Department gives public notification of the CEAP application by mailing notice to: all landowners within a 600 ft. radius of the project boundaries; any organization or members of the public that have expressed a desire to review the material, and; any additional stakeholders as identified by the department project manager. Notice of the CEAP application will also be posted at the project site. In addition, a copy of the material will be available at the public library. The case manager will also circulate the package to other city departments and other concerned agencies, such as County Health. Comments from the public will be incorporated into the Development Review Committee's comments.

7. The Development Review Committee (DRC) reviews the CEAP and makes comments on the assessment. Several outcomes are possible: no environmental impacts are identified; minor environmental impacts are identified that the relevant department can mitigate; major environmental impacts are identified that require major redesign of the project; or environmental impacts are identified and cannot reasonably be mitigated. Although questions of clarification may be asked of the project manager, no revisions to the CEAP are requested.

8. The Planning Department sends a cover memo and comments to the project manager for their consideration.

9. The project manager may choose to redesign elements of the project to address DRC comments and re-submit the CEAP for review or take the project and the city and public review comments to the relevant review board for their consideration.

10. The recommendation is forwarded to select boards for comment if project has goals relevant to other master plans.

11. A public hearing is held with the primary advisory board. The board reviews the CEAP findings including DRC and other board comments. If the advisory board approves the recommended concept plan and CEAP findings, the project recommendation and CEAP are forwarded to City Council and subject to City Council call-up.

12. If the concept plan and CEAP findings are not accepted by the advisory board, project staff may be directed to redesign the project or to provide more detailed analysis of certain impacts and mitigation strategies.

13. If significant project modifications are made, the CEAP is revised and resubmitted to Planning and Development Services for development review. The same process is continued until the project is accepted in concept by the advisory board.

14. The advisory board findings are subject to City Council call-up. If the CEAP is called up, Council holds a public hearing and makes a project approval decision. If Council does not call up the project approval and certification, then the advisory board project approval is final.

15. Once both the advisory board and City Council approve project

recommendations and the CEAP, the project is ready for the final design and engineering phase.

CEAP Review Roles

Department/Project management team:

1) Facilitates planning and design of project.

2) Develops and selects proposed project alternatives.

3) Completes CEAP evaluation and submits to Planning and Development Services for development review.

4) Submits CEAP including staff and public input to the advisory board for approval.

Planning Department staff:

1) Provides technical assistance to project managers as needed.

2) Manages Development Review Committee (DRC) review and comment on CEAP application.

3) Makes a recommendation on project alternatives and CEAP findings through the DRC review.

Development Review Committee:

1) Reviews CEAP for consistency with city policies, master plans, and Boulder Revised Code.

Advisory Board:

1) Selects preferred project type, location, function design.

2) Approves project and CEAP findings.

Planning Board:

1) Reviews and approves only those projects from programs with no advisory board.

City Council:

1) Call-up option on advisory board or Planning Board decision.

CEAP Review and Approval Processes by Department

Transportation funded projects

1. ***CEAP documentation submitted to DRC for comment***
2. ***Non-agenda memo sent to other relevant boards for comment***
3. ***Transportation Advisory Board public hearing and approval***
4. ***City Council call-up option***

Parks and Recreation funded projects

1. ***CEAP documentation submitted to DRC for comment***
2. ***Non-agenda memo sent to other relevant boards for comment***
3. ***Parks and Recreation Advisory Board public hearing and approval***
4. ***City Council call-up option***

Utilities funded projects

1. ***CEAP documentation submitted to DRC for comment***
2. ***Non-agenda memo sent to other relevant boards for comment***
3. ***Water Resources Advisory Board public hearing and approval***
4. ***City Council call-up option***

Greenways funded projects

1. ***CEAP documentation submitted to DRC for comment***

- ***Non-agenda memo sent to other relevant boards for comment***
- ***Greenways Advisory Committee public hearing and approval***

4. ***City Council call-up option***

Projects within a designated Greenway that are funded by other departments (non-Greenways projects

1. ***CEAP documentation submitted to DRC for comment***
2. ***Non-agenda memo sent to Greenways Advisory Committee and other relevant boards for comment***
3. ***Public hearing and advisory board approval***
4. ***City Council call-up option***

Open Space and Mountain Parks projects

1. ***CEAP documentation submitted to DRC for comment***

2. *Non-agenda memo sent to other relevant boards for comment*
3. *Open Space Board of Trustees public hearing and approval*
4. *City Council call-up option*

<u>Library, Fire, Police, Facilities and Assets Management, Downtown and University Hill Management, all other departments</u>

1. *CEAP documentation submitted to DRC for comment*
2. *Non-agenda memo sent to other relevant boards for comment*
3. *Planning Board public hearing and approval*
4. *City Council call-up option*

<u>Projects with multiple board interests</u> (includes public works projects on Parks or Open Space lands):

1. *CEAP documentation submitted to DRC for comment*
2. *Public hearing and approval by relevant boards in a joint board hearing.*
3. *City Council call-up option.*

APPENDIX II-3

LIST OF TRIBUTARIES TO BOULDER CREEK

APPENDIX II-3

LIST OF TRIBUTARIES TO BOULDER CREEK*

Within the city limits there are 13 main tributaries to Boulder Creek and several smaller, mostly unnamed drainages. Drainage basin size for each of these creeks is shown in Table 1. Drainage lengths within the city limits are shown in Table 2.

TABLE 1:
Drainage Basin Size and Drainage Length
for Tributaries Which Flow Within Boulder City Limits

Creek/Drainage Name	Acres	Square Miles
South Boulder Creek	79,815	124.7
Dry Creek	18,889	29.5
Fourmile Canyon Creek	6,200	9.7
Bear Canyon Creek	3,371	5.3
Goose Creek	1,701	2.7
Wonderland Creek	1,348	2.1
Twomile Canyon Creek	1,295	2.0
Sunshine Canyon Creek	1,192	1.9
Gregory Canyon Creek	1,191	1.9
Skunk Creek	1,165	1.8
Viele Channel	791	1.2
Bluebell Canyon Creek	454	0.7
Elmer's Twomile Creek	423	0.7
Kings Gulch	230	0.4

* Source: *Riparian Habitat Assessment Procedure* [Need complete reference.]

TABLE 2: Name and Extent of Drainages Within the City of Boulder, CO.				
Name	**Feet**	**Miles**	**Meters**	**Kilometers**
✻Bear Canyon Creek	33,155.7	6.3	10,106.0	10.1
Bluebell Canyon Creek	10,084.4	1.9	3,073.8	3.1
✻Boulder Creek	39,888.4	7.6	12,158.1	12.2
Dry Creek No. 2	21,868.5	4.1	6,665.6	6.7
Dry Creek No. 2 Ditch	13,713.0	2.6	4,179.8	4.2
✻Elmers Twomile Creek	5,123.6	1.0	1,561.7	1.6
✻Fourmile Canyon Creek	31,343.3	5.9	9,553.5	9.6
✻Goose Creek	15,857.7	3.0	4,833.5	4.8
Gregory Canyon Creek	9,469.1	1.8	2,886.2	2.9
Kings Gulch	6,107.0	1.2	1,861.4	1.9
✻Skunk Creek	23,547.2	4.5	7,177.3	7.2
✻South Boulder Creek	19,693.9	3.7	6,002.8	6.0
Sunshine Creek	15,278.9	2.9	4,657.1	4.7
Twomile Canyon Creek	15,226.8	2.9	4,641.2	4.6
Viele Channel	10,575.0	2.0	3,223.3	3.2
✻Wonderland Creek	22,894.6	4.3	6,978.4	7.0
TOTAL	277,145.1	52.5	84,474.8	84.5
TOTAL WITHIN THE GREENWAYS SYSTEM	191,504.4	36.3	58,371.3	58.4

APPENDIX III-1

GREENWAYS MASTER PLAN UPDATE
SUMMARY OF CULTURAL RESOURCES

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SUMMARY OF CULTURAL RESOURCES*

PREHISTORIC AND HISTORIC BACKGROUND OF THE GREENWAYS SYSTEM

Aboriginal History

Aboriginal groups are known to have occupied northeastern Colorado since at least 11,500 years ago. A number of Stages and Periods have been defined to describe prehistoric culture history. Occupation of the Front Range during the Plano Period (ca. 10,000-7500 BP) has been demonstrated, but earlier occupation is evidenced only by isolated Clovis and Folsom projectile points.

Human use and occupation of the plains/foothills transition zone, including Boulder Valley, during subsequent periods was not continuous but was substantial over the last 5000 years, particularly during the last 2000 years.

The Comanche and Ute occupied Colorado during the 18th century, with the Comanche controlling the plains, and the Ute in the foothills and mountains.

By the early 19th century the Cheyenne and Arapaho began to occupy most of the plains of eastern Colorado (Buckles 1968). Both of these tribes were semi-nomadic, depending primarily on the hunting of bison and other large game animals. The Arapaho also utilized the Front Range, and the Boulder Valley was a winter campsite. In the Treaty of Fort Laramie (1851) a vast area of land was assigned to the Cheyenne and Arapaho as a reservation, including all of Colorado east of the Continental Divide and north of the Arkansas River. Ten years later, however, the Treaty of Fort Wise was signed, requiring their removal from all lands in the earlier treaty except for a small reservation in east-central Colorado (Berthrong 1963). This left Boulder County open for European settlement.

Historic Settlement and Development

In 1858 gold was discovered at the confluence of Cherry Creek and the South Platte River. News of the gold strike in the "Pike's Peak" region quickly spread, and a gold rush began

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* Summary extracted from *A Cultural Resoruce Inventory of the Boulder Greenways,* by Peter J. Gleichman, Native Cultural Services, Boulder, Colorado. February 2001.

(Hafen 1941; Wolle 1949). Precious metal mining became a dominant enterprise in the Colorado Rockies, with periodic mining booms occurring into the first decades of the 20th century.

The first pioneers to settle in Boulder arrived in November, 1858 (Meier 1993). Prospecting for gold in the mountains began soon after, and several mining districts were defined, and mining camps and towns developed. Cycles of boom and bust mining occurred in Boulder County for the next 60+ years.

The initial gold rush and subsequent mining booms attracted more people to the area then could be supported by mining. Those who did not find their fortune in gold or tungsten sought it elsewhere or through other means. The mining booms created the need for other industry, particularly agricultural endeavors to supply meat and produce. Many who could not afford agricultural land elsewhere would take advantage of the passage of the Homestead Act of 1862 and later, the Timber Culture Law of 1873. Settlement of the Boulder Valley and adjacent foothills ensued rapidly, by people engaged in farming or ranching.

Development of water resources also occurred to provide water for agricultural pursuits. The local creeks flowing out of the mountains were tapped by irrigation ditches, starting soon after settlement of the Boulder Valley.

Transportation to and from the mining districts and between communities on the plains was provided by wagon and stagecoach. The railroad reached Boulder in 1873. In the 1880s and 1890s the "Switzerland Trail" railroad was constructed and served the mountain communities. The Denver & Interurban carried passengers between Denver and Boulder until the late 1920s.

The railroads greatly spurred the growth of Boulder, and facilitated mining and extractive industries, both hardrock ores from the mountains and coal and oil from the Boulder Valley.

The first schoolhouse in Colorado Territory was built in Boulder in 1860 (Dyni 1991). Public schools were continually established as the population of Boulder grew. Construction of the University of Colorado was underway by 1875, and the University has been and continues to be a major feature of Boulder.

Chautauqua was established in 1898, and tourism and recreation became important aspects of Boulder, and remain so.

Themes which are relevant to the Greenways study area are thus:

Aboriginal History, ca. 10,000 B.C. to A.D. 1880
Mining and Extractive Industries, ca. 1858 to present
Agriculture, ca. 1859 to present
Urban Residential Neighborhoods, ca. 1858 to present
Water Resources, ca. 1859 to present
Transportation, ca. 1859 to present
Education, ca. 1860 to present
Recreation & Sports, ca. 1859 to present

The Boulder Creek Corridor

The majority of the cultural properties along the Greenways are along Boulder Creek in Reach 6 and 7. Reach 7, extending from Eben Fine Park to just east of Boulder High School has a particularly interesting history.

The railroad played a major role in development of Boulder Creek. Central Park was known as Railroad Park during the 19th century, and was owned by railroads. The railroad up Boulder Canyon brought ore to town from the mines to the west. A switch spur came off Canyon Blvd (then Water Street) in the area of the current "Butterfly Garden" west of 6th St. (see photo in Schoolland 1967:213), and railroad workers lived in a house there.

A number of mills and smelters were present along Boulder Creek from 9th St. west, including the Boyd Smelter (built 1874); Delano Chlorination Mill, later called the Atlas Mill; the Preston Mill west of 9th St. at the current Charles A. Haertling Sculpture Park, the Marshall Mill, and the Yount Flour Mill (pertaining to agriculture, not mining).

Industrial use was not limited to the 19th century. In 1909 the Colorado Vanadium Company rented the old Preston Mill to extract vanadium from roscoelite. In 1918 the Vanadium Alloys Steel Co. of Pennsylvania rebuilt the Boyd Smelter. Around World War I Warren Bleecker began using the Preston Mill for his Tungsten Products Co., but then bought the Lucky Two Mill at Pearl and Canyon and used it to concentrate tungsten. After the collapse of the tungsten industry, Bleecker formed the Radium Company of Colorado to process vanadium and radium. In 1921 Bleecker formed a new company and bought a vacant tungsten refinery on the south bank of Boulder Creek at 3rd and Arapahoe. The laboratory manufactured luminous paint (using radium) and time-bombs for use in oil wells to fracture oil bearing rock. The Bleecker "bomb factory" as it was locally known, burned down on June 26, 1925. Bleecker rebuilt his lab, but in 1928 he became a politician (Meier 1994).

A standard gauge rail crossed Boulder Creek west of Broadway, near the current pedestrian bridge. To the west, all rail crossings were narrow gauge. The Earnest Grill Lumber yard was on the south side of the creek, west of 12th St., between the creek and Arapahoe. The McAlister Lumber yard, abandoned in the 1920s, was north of the tracks near 6th st.

Sand Pits were present on both sides of the creek, from the mouth of Boulder Canyon to at least 9th St., to capture sediment from Boulder Creek. A Conoco gas bulk plant was at the end of 3rd St., west of the current Justice Center.

The current Justice Center was a flat meadow where Gypsies camped with horses and wagons during the 1920s. Later, during the early 1930s, the Civilian Conservation Corps camp SP-2-C was there. Hobos camped along the creek. A softball park was present to the east of 6th St. The free auto camp where Eben Fine Park is now located opened in 1921.

The area between the current municipal building and library was known as "Bugtown" or The Jungle". It was a shanty town which housed Boulder's red light district, low income and unemployed residents during the first three decades of the 20th century. In March 1927 the city announced it would clear the area and "improve" it in line with the Olmsted Plan for Boulder Creek. People were ordered to vacate the area (see photo in Meier 1994:188).

SIGNIFICANCE OF CULTURAL SITES

The significance of historic and archaeological sites is assessed through determining their eligibility for inclusion under one or more classifications or designations. National Register of Historic Places (NRHP) eligibility is judged according the criteria set forth in 36CFR 60.4 below:

"National Register Criteria" means the following criteria established by the Secretary of the Interior for the use in evaluating and determining the eligibility of properties for listing in the National Register: The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

(A) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(B) That are associated with the lives of persons significant in our past; or

(C) That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) That have yielded, or may be likely to yield, information important in prehistory of history.

The State Register of Historic Properties (SRHP) uses essentially the same criteria as above, with the addition of a fifth criterion, that being "geographical importance". All properties eligible to the NRHP are eligible to the SRHP.

Cultural properties which are not eligible to the NRHP or SRHP may be eligible for local landmarking under city of Boulder regulations. Boulder enacted an Historic Preservation Ordinance in 1974, for the purpose of "protecting, enhancing, and perpetuating buildings, sites, and areas of the city reminiscent of past eras, events, and persons important in local, state and national history or providing significant examples of architectural styles of the past."

For management purposes, cultural sites that are eligible for any historic designation should usually receive additional attention prior to modification, disturbance or demolition. Mitigation programs are site-specific and may include, among other things, thorough documentation, excavation, or preservation.

Specific management strategies that have been recommended for Boulder Greenways sites include:

Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or Landmarked.

Cultural properties which are owned by the city, such as Eben Fine and Central Parks, should have preservation of their historical integrity as a priority. The archaeological sites such as the Boyd Smelter, and City Dump at Scott Carpenter Park should be protected from looting. Any new trail construction or alteration, or any earth disturbing activity near these sites should be monitored by an archaeologist to insure remains are not destroyed.

While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible.

The Boulder Valley School District and the University of Colorado should be encouraged to maintain the field buildings at the High School (several of which are not currently used) and the CCC stonework near the High School and on CU property. Some of the stone walls and terraces at CU are in need of repair.

Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway.

However, the most appropriate location for historical interpretation is along Boulder Creek, Reach 7 - from Eben Fine Park to 9th Street or to Broadway. The considerable and fascinating history of this area has been summarized in the Discussion chapter, above. While some of the history does not have extant cultural manifestations, it can still be readily demonstrated with historical photos. This would also provide some continuity with the interpretive signs done by Boulder County for the Pioneer Trail, which extends west up Boulder Canyon from Eben Fine Park.

CULTURAL SITES LOCATED WITHIN THE GREENWAYS SYSTEM

Stream Reach: Fourmile Canyon Creek 3
Site Number: 5BL6632 - Farmers Ditch
Background: Site 5BL6632 is the Farmers Ditch. Its headgate is on the north side of Boulder Creek, near Pearl Street. The ditch flows north through the Mapleton Hill area, then northeast through the Boulder Valley Ranch before ending at 55th street and dispersing any remaining water to the Boulder Reservoir basin. The bridges and tunnel of that ditch section through the city of Boulder are fairly well documented in the Carnegie Branch Library for Local History in Boulder.

The Farmers Ditch was built circa 1862 at a cost of $5500 (Tourtellote & Thomas 1862b). Its priority number is 14, with a date of fee appropriation of October 1, 1862 for 3000 acre feet of water (Dyni 1989). Originally, during the ditch's inception, Jonathan A. Tourtellote and Jerome Thomas were the Farmers Ditch Company directors (Tourtellote & Thomas 1862a), the former also being the treasurer and the latter the secretary (Tourtellote & Thomas 1862b). Jonathan A. Tourtellote, the primary signer of the Farmers Ditch Company Documents to the Boulder County Board of Commissioners, was a Boulder merchant. Arriving to Boulder in 1860, he and his brother-in-law bought a log building at 11th and Pearl Streets, founding "Tourtellote & Squires," a general store, hotel and boarding house. Tourtellote and company operated this business until 1865, also buying real state. Tourtellote and Squires soon resumed shop, dealing in the lumber, mercantile and mining businesses, in which Tourtellote stayed until his death in 1871. His son carried the business on. Historically the ditch was one of those owned by James P. Maxwell, and in 1873 his Boulder Aqueduct Company was allowed by the city to run a wooden-pipe waterworks along primary streets (Smith 1986). It powered the Yount-McKenzie Flour Mill. The ditch also fed Wolff's orchard or "Rattlesnake Ranch" on the east side of Broadway and, during World War I, the Mapleton School children's victory garden, before reaching the North Boulder Valley.

Notes: 4 aerial crossings of the creek by pipes carrying water from 5BL3813, The Silver Lake Ditch. These are feeders from a lateral of the ditch, and while the Silver Lake Ditch is significant, feeder ditches are not considered significant elements of the ditch. These are between 19th and 26th streets.

A variety of creek bank treatments are present between 19th and 26th streets, including stacked cobbles, stones in cement, and concrete. These bank treatments are only in a few places, and none appear to be very old.

Significance: Unaltered segments of the Farmers Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

<u>Stream Reach</u>: Fourmile Canyon Creek 5
Site Number: 5BL3813 - Silver Lake Ditch
Background: Site 5BL3813 is the Silver Lake Ditch. The headgate for the ditch is on the north side of Boulder Creek, slightly west of the rock formation known as Lover's Leap. The ditch flows down the side of the canyon in a metal flume which replaced an original wooden flume. The ditch then routes north of Settlers Park and around the mouth of Sunshine Canyon. It flows north along the Dakota Ridge to Wonderland Lake, and northeast to Mesa Reservoir.

The ditch was constructed by J.P. Maxwell and George Oliver, and has an appropriation date of February 28, 1888, with an appropriation of 20 c.f.s. from Boulder Creek. The ditch was constructed to irrigate 1000 acres, and to provide storage of water in Mesa Reservoir. Mesa Reservoir has a decree date of 1893. The ditch also was used to supply water to Mesa Park Reservoir (Wonderland Lake), constructed somewhat later, around 1905. Other features of this water transport and storage system are Silver Lake Reservoir and Island Lake Reservoir, built in the high country to supply water to the ditch. These two reservoirs were sold to the city in 1906. The ditch was sold by Maxwell and Oliver in 1907, and has an adjudication date of March 13, 1907. There have been other appropriations and abandonments of water for the ditch between 1900 and 1988.

Significance: Unaltered segments of the Silver Lake Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

<u>Stream Reach</u>: Wonderland Creek 4/5
Site Number: 5BL6632- Farmers Ditch
Background: See Fourmile Canyon Creek Reach 3
Significance: See Fourmile Canyon Creek Reach 3

<u>Stream Reach</u>: Wonderland Creek 8
Site Number: 5BL3814 - Wonderland Lake; 5 BL3815 - Degge Fish Rearing Complex
Background: Wonderland Lake was originally known as Mesa Park Reservoir, and according to Everett Long was constructed by J.P. Maxwell and C.M. Tyler around 1905. The first adjudication on file at the Water Records, State Engineers Office, was April 10, 1905, with W.R. Rathbon as the claimant. The lake was sold to Dudly A. Degge in 1907, with an appropriation date of February 7, 1907, and an adjudication date of November 3, 1909. the decreed amount is 1219.42 acre feet. The reservoir has been colloquially known as West Degge Lake or Little Degge Lake, and Mesa Reservoir was known as East Degge Lake or Big Degge Lake. Drumm's Pocket Map of Boulder County for 1925 still has it as Mesa Park Reservoir, and that is the name used in the State Water Records. Degge reportedly wanted the lake and vicinity for land development, to attract housing to the vicinity, but housing development around the lake did not occur until many years later. Informants recall sneaking into the lake to swim, a challenging adventure because Dudley Degge used to sit in his car parked near the lake and guard the lake. Informants also recall the lake freezing hard enough in winter to sail ice boats on. The lake currently covers about 25 acres. When the lake was acquired by Open Space, the dam was found to be unsafe and extensively rebuilt.

The Degge Fish Rearing Complex. Several historic features were found to the east of Wonderland Lake. These consisted of two small dams and a fish hatchery, and concrete pads apparently from small structures. All of these features were probably constructed by Dudley A. Degge, the owner of the lake. The dams were probably related to ponds that Degge built for rearing black bass. The venture was at least partially commercial, as he furnished bass to stock lakes in the Hygiene area. The fish rearing operation was constructed prior to the 1920's, perhaps before World War 1 (W.W. Degge Jr., personal communication to D.M. Teegarden).

Significance: Sites which are not individually eligible to the NRHP may be eligible as elements of districts. They are also eligible to the SRHP or for City Landmarking. This would include Wonderland Lake (5BL3814).

<u>Stream Reach</u>: Goose Creek 3
Site Number: 5BL5820 - Boulder and Left Hand Ditch; 5BL6879 - North Boulder Farmers Ditch
Background: 5BL5820 is the Boulder and Left Hand Ditch. It shares a headgate on Boulder Creek in Central Park with the adjacent North Boulder Farmers Ditch (5BL6879), and Boulder and White Rock Ditch (5BL859). The Boulder and Left Hand Ditch has a decree date of December 1, 1873 for 82.8 cfs, with a priority number of 36 for water from Boulder Creek. It was enlarged April 1, 1876, with an appropriation of another 81 cfs. and an

adjudication date of May 2, 1882. It has a physical capacity of 35 cfs. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel.

5BL6879 is the North Boulder Farmers Ditch. The ditch shares the headgate on Boulder Creek in Central Park with the Boulder White Rock Ditch (5BL859) and the Boulder Left Hand Ditch (5BL5820). It is roughly parallel and south of the adjacent Boulder and Left Hand Ditch. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel. The North Boulder Farmers Ditch has a date of decree of 1862, with a priority number of 11 for water from Boulder Creek, with an appropriation of 10.78 cfs of water. It was first enlarged in 1863 for 65.25 cfs, with both appropriations adjudicated on June 2, 1882. The physical capacity of the ditch is 48 cfs.

Significance: Unaltered sections of the Boulder and Left Hand Ditch and the North Boulder Farmers Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

<u>Stream Reach</u>: Goose Creek 4
Site Number: 5BL400 - Colorado & Southern Railroad
Background: 5BL400 is the Colorado & Southern Railroad. Rail services arrived in southeastern Boulder County during the period of early settlement. In 1872-1873, the Colorado Central Railroad laid tracks to Longmont and then to a connection with the Union Pacific near Greeley. During the late 1880s, the Colorado Central merged into the Union Pacific system. Later, after UP receivership, the old Colorado Central became the core of the newly created Colorado & Southern Railroad. The Colorado & Southern then became a subsidiary of the Chicago, Burlington & Quincy until the early 1970s when the Burlington Northern was created.

Significance: The C&S Railroad is eligible for nomination to the NRHP for its historic association with the development of Transportation.

<u>Stream Reach</u>: Goose Creek 5
Site Number: 5BL859 - Boulder & White Rock Ditch
Background: 5BL859 is the Boulder & White Rock Ditch. The Boulder and White Rock Ditch shares a headgate on Boulder Creek in Central Park with the North Boulder Farmers Ditch (5BL6879) and the Boulder Left Hand Ditch (5BL5820). The Boulder & White Rock Ditch Co. was incorporated January, 1871 by Alpheus Wright, Granville Berkley and his two

sons -Granville Jr. and Junius, Samuel Hayden and Thomas Graham. The ditch was constructed in 1872 to provide irrigation to farms north of Boulder. It has an appropriation date of November 1, 1873 for 135 cfs, with an adjudication date of June 2, 1882. An appropriation of 26 cfs from Goose Creek on December 1, 1873 was adjudicated May 5, 1892. The State Engineer lists the physical capacity of the ditch at 100 cfs. The ditch averages 20 feet in width and reaches 15 to 20 feet in depth.

Significance: Unaltered portions of the Boulder & White Rock Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

<u>Stream Reach</u>: Boulder Creek 2
Site Number: 5BL400 - Colorado & Southern Railroad
Background: See Goose Creek 4
Significance: The C&S Railroad is eligible for nomination to the NRHP for its association with the development of Transportation.

<u>Stream Reach</u>: Boulder Creek 5
Site Numbers: 5BL8820 - City Dump; 5BL8819 - Wellman Ditch
Background: 5BL8820 is the City Dump which is under Scott Carpenter Park.
The former city dump still exists under the sod at the park. Shards of glass and ceramics are visible along the path near the creek, and complete bottles were recovered during construction of the current path. The horizontal and vertical extent of the dump deposits are unknown.

In 1895 the city raised 25,000 to buy land at the eastern city limits and establish a dump and sewage settling basin. A sewer main brought waste material to the basin where it sat until being expelled into Boulder Creek. Additional sewer lines were added over time, and by 1920 much of the city was serviced by sewers. A sewage disposal plant was constructed over the settling basin in 1933, and the adjacent dump was closed (Smith 1981:190-191).

5BL8819 is the Wellman Ditch, aka Wellman Feeder Ditch, aka Empson Ditch. The Wellman Ditch diverts water from Boulder Creek at 28th Street, and delivers it to South Boulder Creek. The water then flows north in South Boulder Creek, and is diverted at Arapahoe Avenue into a canal that feeds the Leggett Reservoir, part of the Valmont Power Plant complex. The Wellman Ditch has a date of Fee Appropriation of May 1, 1878, for 1200 acre/ft. It has priority number 39 from Boulder Creek.

Significance: The City Dump (5BL8820) is eligible for nomination to the NRHP as an archaeological site, as it is likely to yield information important to history. Unaltered portions of the Wellman Feeder Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

<u>Stream Reach:</u> Boulder Creek 6
Site Numbers: 5BL3742- residence at 1213 17th Street; 5BL3762- Sutherland Residence at 1601 Hillside; 5BL3763-Shattuck Residence at 1605 Hillside; 5BL4675-Boulder High School; 5BL5929-Watts Residence at 120_ 17th Street; 5BL5930-residence at 1230 17th Street; 5BL6167-Parce/Ronshoot/Pollard Residence; 5 BL6169-Pollard/Tisone Residence at 1709 Hillside.
Background: 5BL3742 is a residence at 1213 17th Street. It is a one-story house of cut stone masonry, in the modern style, built in 1938. 5BL3762 is the Sutherland Residence at 1601 Hillside. It is a two-story house with shingled walls atop a stone foundation, a vernacular bungalow built in 1910. In 1926 Blanche Sutherland, an instructor at C.U. bought the house and lived there until the 1940s. 5BL3763 is the Shattuck Residence at 1605 Hillside. It is a two-story house in the Tudor Revival style, built in 1905 by Herbert Shattuck, developer of the Hillside Park subdivision.

5BL4675 is Boulder High School. The Art Moderne style building is asymmetrical, composed of narrow layers of native sandstone. The main entrance bay is 3 stories and includes fixed pane windows grouped in four, and glazed doors with transoms; eastern wing projects slightly forward and has 2-story section with curved wall topped by windows in concrete band; behind this is a 4-story tower with clock and glass block. Western wing has bands of multi-light windows with metal sash on second and third stories; 3-light windows on first story, and a one-story northern projection. Rear of building has a 3-story projection with intersecting wing. Construction began in 1935, and the school was dedicated in November 1937. Architects were Frank W. Frewen, Earl C. Morris, and Glen H. Huntington. The PWA (Public Works Administration) provided 45% of the cost, which was in excess of $500,000. The YMCA provided a gift of $10,000. The building replaced the State Preparatory School. A field house was built in 1948, and in 1956 an addition extended the shop and cafeteria, added a third floor to the east wing and a girl's gymnasium.

5BL5929 is the Watts Residence at 1220 17th Street. It is a 1 ½ story house in the English/Norman Cottage style, built in 1925. Kate and Fred Watts resided there. The Watts came to Boulder in 1920, and founded the Watts Dairy, which became the Watts-Hardy Dairy, bought by Sinton foods in 1983. The Watts died in 1985. 5BL5930 is a residence at 1230 17th Street. It is a 1 ½ story vernacular house with bungalow style details, such as shingled walls, overhanging eaves and exposed rafters, and multi-light windows. It was built in 1906.

5BL6167 is the Parce/Ronshoot/Pollard Residence at 1707 Hillside. It is a 1 ½ story house with rock rubble walls, in the Craftsman style, built in 1905. W.W. Parce was a landscape architect who designed the ground of Chautauqua, C.U., and the courthouse square. He was an associate of Frederick Law Olmsted. 5BL6169 is the Pollard/Tisone Residence at 1709 Hillside. It is a 2-story house in the English/Norman Cottage style, built in 1938. Edith N. Pollard lived there. She was a member of the Board of Directors of the Boulder Public Library, and President of the Boulder Historical Society. A.F. Tisone lived there subsequent to Pollard. He was president of Watts-Hardy Dairy for 32 years.
Significance: Boulder High School, the Watts Residence, the Parce/Ronshoot/Pollard Residence and the Pollard/Trine Residence have been evaluated as eligible for nomination to the NRHP. The remaining sites have not been evaluated in terms of significance. The three residences may also be eligible for nomination to the NRHP as components of a potential Hillside Road Historic District.

<u>Stream Reach:</u> Boulder Creek - 7
Site Numbers: 5BL358 - Switzerland Trail; 5BL364 - Highland School; 5BL606 - Train at Central Park; 5BL1129 - Yocum Building, 1724 Broadway; 5BL5680-Bandshell at Central Park; 5BL5820 - Headgate, Boulder & Lefthand Ditch; 5BL5990, 5991, 5992, 5993, 5994 - Athletic field facilities at Boulder High, including the ticket booth, restroom, concession stand and grandstand/pressbox, respectively; 5BL6017 - Eben Fine Park, which surrounds 5BL6015 and 5BL6016, the shelter and restroom at Eben Fine Park, respectively; 5BL6062- the bridge at Broadway; 5BL6063 - Central Park; 5BL7094 - Boyd Smelter; 5BL8821 - CCC Stonework; 5BL8822- Sand Pits.
Background: 5BL358 is the Switzerland Trail, the railroad which was known variously as the Greeley, Salt Lake & Pacific RR, the Colorado & Northwestern RR, and the Denver, Boulder & Western RR.

The railroad bed still exists, and parallels Boulder Creek from the mouth of the canyon, west. That portion of the road bed is currently used as the Boulder Creek Pioneer Trail. Several ashlar bridge abutments from the railroad still exist in the creek. East of Eben Fine Park, a few ashlar stones forming the foundation to a bridge abutment are on the south side of the creek.

The first railways reached the city of Boulder in 1873. The first railway from Boulder into the mountains was constructed by the Union Pacific, and was called the Greeley, Salt Lake & Pacific Railroad. It ran through Four Mile Canyon to reach the townsite of Sunset in 1883. This first mountain advance was literally washed out in 1894 by flooding. In 1895, Boulder Inter-mountain Railway was incorporated to build a new line, but nothing came of this until a

one-time engineer, L.M. Leach, took over and had a new Four Mile Canyon route surveyed (Crossen 1992).

Leach's success came in selling the idea to investors in New York and Pennsylvania. With new investors, the Colorado & Northwestern Railway Company was formed, and by 1898 a new, narrow-gauge railway was constructed to Ward, via Four Mile Canyon and Sunset.

The railway was built on the premise that the mines could provide enough ore for shipment to make the line profitable. The railroad company also intended to take advantage of tourist and passenger trade opportunities provided by their scenic mountain route: hence the evocative moniker of "Switzerland Trail."

However, the quantity of ore shipped did not live up to hopes, nor was the tourist trade brisk enough to offset the costs of maintaining a mountain road through snowy winters. In 1909 the railroad was sold and became the Denver, Boulder, & Western. The only years the railroad showed a profit were 1909 and 1910, hauling freight for the construction of Barker Reservoir at Nederland; and finally in 1916 with the tungsten boom (Holder 1981).

The Denver, Boulder & Western Railroad ceased operation, and the ties and rails were removed in 1919 and 1920.

5BL364 is the Highland School, at 885 Arapahoe Ave. The 2 ½ story brick and sandstone school was built in 1891-92. It was designed by Denver architects E.P. Varian and Frederick Sterner in the Richardsonian Romanesque Revival style. It is built of red brick with sandstone string coursing, lintels, sills & arches above the 2nd floor windows; a projecting entrance with an ogee arch; gabled dormers with arched windows and turrets. The bridge off 9th Street over Gregory Creek (aka Mariposa Creek) to the southeast parking lot is in the study area. The bridge is brick and sandstone ashlar, with a well-done wet-laid coursed cobble foundation. The foundation has a concrete culvert to allow Gregory Creek to flow to its confluence with Boulder Creek. An iron grill gate is present.

This was Boulder's fourth permanent school. From 1893-95 it was the location of the University's Preparatory Dept. It was last used as an elementary school in 1970, and now is an office building.

5BL606 is the Colorado & Northwestern RR Train in Central Park. The train is comprised of four units - Locomotive #30, the tender (C&NW RR #30), a passenger car (D&RGW#280), and a caboose (D&RGW #04990). Locomotive #30 operated on the Switzerland Trail between Boulder, Eldora, and Ward from 1898 to 1919; and on the Denver, South Park &

Pacific RR and the Rio Grande Southern RR until 1952. In 1953 the train was placed in Central Park, formerly known as "Railroad Park" until 1933.

5BL1129 is Yocom Studio, at 1724 Broadway. This building in 19th Century Commercial style, was built in 1907 as a photo studio by LLoyd E. Nelson, photographer. In 1932 Daniel Lee Yocom opened his photo studio in the building. Yocom lived and worked in the building for 40 years, retiring in 1972. The building is currently used as a restaurant (La Estrellita).

5BL5680 is the Bandshell in Central Park. The Bandshell was designed by architect Glenn Huntington, and erected by the Lions Club in 1938 at a cost of $3,825. The Bandshell is an elliptical amphitheater of wood. It has been extensively restored recently.
The Bandshell is a city of Boulder Landmark.

5BL5820 is the Boulder and Left Hand Ditch. It shares a headgate on Boulder Creek in Central Park with the adjacent North Boulder Farmers Ditch (5BL6879), and Boulder and White Rock Ditch (5BL859). The Boulder and Left Hand Ditch has a decree date of December 1, 1873 for 82.8 cfs, with a priority number of 36 for water from Boulder Creek. It was enlarged April 1, 1876, with an appropriation of another 81 cfs. and an adjudication date of May 2, 1882. It has a physical capacity of 35 cfs. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel.

5BL5990 is the Boulder High Field Ticket Booth. The booth is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof, a concrete foundation and water table, and a concrete apron in front of the ticket windows. The windows, with wooden sills, are boarded up. The booth was built in 1948 with a contribution of $1100 from W. H. McKenna, a retired tungsten miner who contributed to several schools and universities. The stonework is in the style of CU buildings.

5BL5991 is the Boulder High Field Restroom. The restroom is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof with slightly overhanging eaves, a concrete foundation, slab doors, and covered windows with concrete sills. The restroom was built in 1948 as part of the expansion of the high school athletic field and facilities. The stonework is in the style of CU buildings.

5BL5992 is the Boulder High Field Concession Stand. The concession stand is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof with overhanging eaves and exposed rafters, a concrete foundation, slab door, and plate glass

window. The concession stand was built in 1948 as part of the expansion of the high school athletic field and facilities. The stonework is in the style of CU buildings.

5BL5993 is the Boulder High Field Grandstand/Press Box. The grandstands are composed of concrete tiered bases currently topped by metal seats (originally cement and wooden seats). Capacity is 5000 spectators. The press box is behind and elevated above the grandstand, and is composed of walls of layered sandstone with a hipped roof. The building has shed roofed frame porch with exposed rafters. The west end has a tower with a second story open towards the field (north). The center section of the grandstand was built in 1948, donated by the Boulder Elk's club, and was originally flanked by temporary stands. A combination press box and ticket booth was erected at the back of the stands.

5BL5994 is the Boulder High Fieldhouse. The fieldhouse is a side-gabled 1 ½ story building. The lower story has shed roofed additions on the east and west of layered sandstone of varying thickness. The end walls of the lower story are brick, the foundation is concrete. The upper story is frame construction with asbestos siding. A brick chimney is at the rear. The fieldhouse was part of the expansion and improvement of athletic facilities at Boulder High which took place in 1948. An older building was remodeled and expanded.

5BL6015 is the Shelter House at Eben Fine Park. The shelter house is a one-story picnic shelter built of rock rubble walls, with a Craftsman style hipped roof with overhanging eaves and exposed rafters. The building has a concrete floor, center entrance, and rectangular window openings between stone piers supporting the roof. The shelter was built in 1921, and provided cooking facilities at the auto camp which is now Eben Fine Park (see 5BL6017).

5BL6016 is the Restroom at Eben Fine Park. The restroom is one-story, with rock rubble walls and a hipped roof with overhanging eaves and exposed rafters; small vented gables and metal roofing. It has off-center slab doors and a paneled center door, double-hung, 2/2 light windows with concrete sills and lintels. The restroom was built in 1921 for the auto camp which is now Eben Fine Park (see 5BL6017).

5BL6017 is Eben Fine Park. The park is ca 3.5 acres, located along the south bank of Boulder Creek, between the creek and Arapahoe Ave., from 3rd St. west to the city limits. The park was originally a free public auto camp, opening in June, 1921. It was developed and given to the city by the Auto Trades Association, the Commercial Association, the Lions Club, and the Rotary Club. The auto camp with its stone shelter (5BL615) with cooking facilities, and restroom (5BL616) was built to attract tourists to Boulder. In 1923 6,662 visitors from 42 states used the camp. As motels were developed the camp was converted to provide facilities

for travel trailers. In 1960 the site was dedicated as a public park, named after Eben G. Fine, a pharmacist and booster of the city who was active in the Boulder Parks system.

5BL6062 is the Broadway Bridge, spanning Boulder Creek at Broadway. The bridge, a two-span steel girder reinforced concrete deck arch highway bridge, was built around 1921. Concrete abutments are at the north and south ends with a concrete pier in the middle. Both sides have concrete railing, divided into 5 segments per span by short concrete piers with clathri in between. It is 102 ft long in two 49 foot spans, and 78 ft wide.

5BL6063 is Central Park. The park, approximately 4 acres, was originally owned by railroads and known as "Railroad Park". The city began buying it in 1906, with further parcels bought in 1915. The final tracts were acquired in 1933, after which it was called Central Park. In 1938 the Lions Club donated and erected the Bandshell (5BL5680), designed by architect Glenn Huntington. In 1953 the train (5BL606) from the Switzerland Trail (Colorado & Northwestern RR) was placed in Central Park.

5BL7094 is the remnants of the Boyd Smelter. Foundation walls and scattered artifacts are present. A head gate and diversion wall built to provide water to the smelter are also present. Stone abutments which supported an aerial crossing of the creek by a water line are present on both sides of the creek.

The smelter was built by J.H. Boyd in 1874 to process ores from the hardrock mines west of Boulder. The smelter was a success, though Boyd sold it in 1882 due to poor health. In 1885 Messers Lord & Co. purchased the smelter and built a reverberating furnace 40 feet long, six feet wide and eight feet high.

5BL8821 is Civilian Conservation Corps (CCC) Stonework along Boulder Creek, most or all done by the CCC in the 1930s. There are three areas which contain stonework.
1) Below Folsom Field: South of the creek is a terraced hillside below the stadium. The eight terraces are created by rubble walls, mostly dry-laid, but with some cement mortar in places. The walls are up to 5 ft high. The lowest wall, at the floodplain, curves around the base of the hill for ca 330 ft. Higher walls are progressively shorter. According to Bill Deno, University Architect, the stadium at that time was a simple bowl, and there was an oval track for the 100 yd dash, with one end of the oval extending out to the hill, so that the terraces were needed to support the track at the top of the hill. The stone abutments and piers for the pedestrian bridge here are CCC work, and the concrete auto bridge is also reportedly CCC work.

2) By 19th St., where the steam pipe makes an aerial crossing of the creek from the campus to Family Housing: The abutments for the pedestrian bridge are CCC stonework, as are the

stone walls along the creek banks and terraces going up the hill to the campus. The walls along the creek are dry-laid rubble, capped with cement. The walls extend east from the pedestrian bridge, with the wall on the north side running along the creek bank and then curving away from the current bank. It is about 365 ft long, and 2-4 ft high. The wall along the south side of the creek stays along the creek bank, is about 300 ft long, and up to 5 ft high. There are also dry-laid walls forming 4 terraces going up the hill to the campus, apparently providing stabilization for the path that goes up the hill.

Also present in this area is the ruin of a warming hut or shelter, which may not be CCC work. Rubble walls in concrete mortar are present just east of the path to the campus, built up against the hillside. The wall built against the hill is ca 75 ft long, and 9-12 ft high. It contains a fireplace and chimney in the center of the wall. Side walls extend north from the back wall for 15 ft. The warming hut may not have been totally enclosed, but a shelter with a shed roof and partial side walls. The hut served the C.U. ice rink, which was adjacent in the 1930s, and possibly in the 1920s. After World War II the ice rink was replaced with tennis courts. The tennis courts were demolished in the 1970s, and the area restored into wetlands (Bill Deno, personal communication).

3)By Boulder High School: From the pedestrian bridge which is just east of the Arapahoe Avenue bridge, a stone wall extends east along the south bank of the creek for about 825 feet, with a few gaps. The wall is dry-laid rubble about 3 ft high, with a concrete cap in places, and sandstone slab cap in places. There are some concrete slabs used as stones in the wall, and in some places tabular sandstone is used as opposed to cobbles.

5BL8822 are the Sand Pits along Boulder Creek. Sand pits had been excavated along Boulder Creek, from the area of the current Eben Fine Park, east to 9th St. The pits were on both sides of the creek, and the creek was diverted to flow through the sand pits in the spring when it had a heavy sediment load. The sediment would be deposited in the pits, and the sand was later quarried and used. The date of the sand pits is unknown, but they were still in use in the 1920s and 1930s. The current Kids Fishing Ponds are former sand pits, and the diversion headgate next to the western pond was built to divert water into the pits.

Other vestiges of rubble/cobble walls are present on both sides of the creek near 9th St., which are from the pits. A sand pit was present under the 9th St. bridge, and a dam was formerly present there. A 25 foot long concrete and rubble wall is still standing on the south side of the creek, west of 9th St., which formerly supported a headgate for diverting water into a pit along the south bank.

Significance: The Highland School (5BL364), the Bandshell at Central Park (5BL5680), and the Boyd Smelter (5BL7094) are City Landmarks. The Switzerland Trail (5BL358) is listed on the NRHP. The Colorado and Northwestern Train at Central Park (5BL606) is eligible for nomination to the NRHP for its association with the historic theme of Transportation. Unaltered portions of the Boulder & Left Hand Ditch (5BL5820) are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation. Boulder High School (5BL4675) is eligible to the NRHP as a type of construction and for its association with significant persons and events (Education). The Civilian Conservation Corps stonework (5BL8821) is eligible as a type of construction and for its association with Education and with the CCC and the Great Depression. Sites which are not individually eligible to the NRHP may be eligible as elements of districts. They are also eligible to the SRHP or for City Landmarking. This would include Eben Fine Park and the shelter and restroom (5BL6015-6017), and Central Park (5BL6063); the field buildings at Boulder High (5BL5990-59994); the Broadway Bridge (5BL6062), and Yocom Studio (5BL1129).

<u>Stream Reach:</u> Skunk Creek - 2
Site Number: 5BL8819 - Wellman Ditch
Background: See Boulder Creek Reach 5.
Significance: See Boulder Creek Reach 5.

<u>Stream Reach:</u> Skunk Creek - 5
Site Numbers: 5BL3935 - Anderson Ditch; 5BL5954 - Green Mountain Cemetary; 5BL8823 - Concrete dam, diversion and pipe.
Background: Site 5BL3935 is the Anderson Ditch. The headgate for the ditch is on the south side of the creek, at the mouth of Boulder Canyon. The ditch extends south and southeast through Columbia Cemetery and the University Hill area, and flows through Green Mountain Cemetery to Table Mesa Drive. It then continues east along Table Mesa Drive to South Boulder Road which it follows to South Boulder Creek and Baseline Reservoir. The ditch is still active.

The Anderson Ditch was built by the Anderson Ditch Company and dates to October 1, 1860 with an appropriation of 80 acres from Boulder Creek (Dyni 1989; Smith 1986). This ditch was the fourth ditch built off of Boulder Creek (Dyni 1989). The Anderson Ditch Co. was incorporated in 1871 by Jonas Anderson, Marinus G. Smith, and George A. Andrews. In 1874, Anderson donated ten shares in the ditch to the planned University of Colorado. That water has irrigated the University since. The ditch was extended in 1875. In 1891 the company was reorganized as the "New Anderson Ditch Co."

5BL5954 is the Green Mountain Cemetery. The cemetery was established in 1904 by the Boulder Cemetery Association, to replace the older Pioneer (Columbia) Cemetery. The leader of the Boulder Cemetery Association was David E. Dobbins, a real estate developer. Approximately 36 acres were acquired from the "rear portion of the 170 acre Old Poor Farm". When the Green Mt. Cemetery opened, 91 bodies were moved from Columbia Cemetery and reinterred. The Green Mt. Cemetery followed the trends of the time, with a rural, park-like setting with curving roads providing access to graves.

5BL8823 is an abandoned irrigation feature at NIST. The feature is along Skunk Creek, just south of the Green Mt. Cemetery. A diversion is present, consisting of a concrete dam spanning the creek, ca 21.5 ft long, 10 inches wide, with a 3'6" gate in the middle to allow the creek through. A small 16" wide gate on the south side of the creek allows water into an 8" pipe. The pipe extends east along the south bank of the creek for about 50 ft. The pipe is on the surface, set in concrete blocks periodically along its length. It apparently allowed water to irrigate the fields south of the cemetery, east of the creek.

Significance: Unaltered segments of the Anderson Ditch (5BL3935) are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation. The Green Mountain Cemetary (5BL5954) is eligible for nomination to the NRHP for its association with Community Development and as a type of construction. The abandoned irrigation feature recorded as 5BL8823 is probably not eligible for nomination to the NRHP or SRHP or as a City Landmark.

<u>Stream Reach:</u> Bear Creek - 1 / 2
Site Number: 5BL8819 - Wellman Ditch
Background: See Boulder Creek Reach 5.
Significance: See Boulder Creek Reach 5.

<u>Stream Reach:</u> South Boulder Creek - 2
Site Numbers: 5BL400-Colorado and Southern Railroad; 5BL799- Valmont Steam Generating Plant, Leggett Inlet, Leggett Outlet; 5BL469-Union Pacific Railroad Spur.
Background: Colorado & Southern Railroad - see Goose Creek Reach 4.
5BL469 is the Union Pacific Railroad. In 1870 a group including John Evans, Walter Cheeseman, William Turner, and William Byers organized the Denver & Boulder Valley Railroad Company with capital of $825,000. Track was laid from Brighton to the Erie coal fields. By 1873 the rails had reached the east side of Boulder. In 1873 the D&BV RR was leased to the Denver Pacific RR, which was owned by many of the same people. The DP RR went into receivership in April 1878, was purchased by Jay Gould, and then sold to the Union

Pacific. The Union Pacific extended the tracks to the west side of Boulder in 1881 to access mountain railways being constructed to serve the mining communities.
5BL799 is the Valmont Steam Electric Generating Plant, which includes Leggett Reservoir, the Leggett Inlet & Outlet. The Valmont power plant was built in 1923. Prior to 1900 there were two lakes at the site - Pancost's Lake and Cove's Lake. Pancost Lake or reservoir was built about 1863. About 1911 the "Pancost Reservoir Enlargement" became Leggett Reservoir, as the enlargement decree was held by the Leggett Ditch Co. Hillcrest Reservoir, an adjacent lake, was developed about 1917. Both the Hillcrest and Leggett reservoirs were inundated by the Valmont Reservoir, essentially forming one lake. By 1920 Public Service Co. owned 7/9 of Hillcrest Reservoir, and had an agreement with the Leggett ditch Co. to store water in the lake. Water is delivered from Boulder Creek to South Boulder Creek via the Wellman ditch (5BL8819), and then taken from South Boulder Creek via the Leggett Inlet Ditch, aka Hillcrest Feeder Ditch, to the lake. Water is returned to South Boulder Creek via the Leggett Outlet Ditch, where it flows into Boulder Creek and is diverted into the Leggett Ditch (5BL860) for irrigation purposes. The reservoir system was enlarged to its current configuration in 1962.
Significance: The Colorado & Southern Railroad and the Union Pacific Railroad are eligible for nomination to the NRHP for their association with transportation. The Valmont Power Plant and associated features are eligible for nomination to the NRHP for their association with energy development.

<u>Stream Reach:</u> South Boulder Creek 3
Site Number: 5BL8819 - Wellman Ditch
Background: See Boulder Creek Reach 5.
Significance: See Boulder Creek Reach 5.

TABLE 1
CULTURAL RESOURCES SUMMARY

STREAM REACH	SITE NO./NAME	SIGNIFICANCE			COMMENTS
		NRHP	SRHP	LANDMARK	
Fourmile Canyon Creek 3	5BL6632-Farmers Ditch	Eligible	Eligible		Unaltered portions
Fourmile Canyon Creek 5	5BL3813-Silver Lake Ditch	Eligible	Eligible		Unaltered portions
Wonderland Creek 4/5	5BL6632-Farmers Ditch	Eligible	Eligible		Unaltered portions
Wonderland Creek 8	5BL3814-Wonderland Lake	Eligible	Eligible	Eligible	May be eligible as a component of an historic district, but not individually eligible.
	5BL3815-Degge Fish Rearing Complex				
Goose Creek 3	5BL5820-Boulder & Left Hand Ditch	Eligible	Eligible		Unaltered portions
	5BL6879-North Boulder Farmers Ditch	Eligible	Eligible		Unaltered portions
Goose Creek 4	5BL400-Colorado & Southern Railroad	Eligible	Eligible		

STREAM REACH	SITE NO./NAME	SIGNIFICANCE			COMMENTS
		NRHP	SRHP	LANDMARK	
Goose Creek 5	5BL859-Boulder & White Rock Ditch	Eligible	Eligible		Unaltered portions
Boulder Creek 2	5BL400-Colorado & Southern Railroad	Eligible	Eligible		
Boulder Creek 5	5BL8820-City Dump	Eligible	Eligible		Site should be protected from looting and disturbance should be monitored by an archaeologist.
	5BL8819-Wellman Ditch	Eligible	Eligible		Unaltered portions
Boulder Creek 6	5BL3742- 1213 17th Street	?	?	?	Possibly eligible as component of an historic neighborhood district
	5BL3762-Sutherland Residence 1601 Hillside	?	?		Possibly eligible as component of an historic neighborhood district
	5BL3763-Shattuck Residence 1605 Hillside	?	?		Possibly eligible as component of an historic neighborhood district
	5BL4675- Boulder High	Eligible	Eligible		

STREAM REACH	SITE NO./NAME	SIGNIFICANCE			COMMENTS
		NRHP	SRHP	LANDMARK	
	5BL5929-Watts Residence 120? 17th Street	Eligible	Eligible		Eligible individually or as component of an historic neighborhood district
	5BL5930- 1230 17th Street	?	?	?	Possibly eligible as component of an historic neighborhood district
	5BL6167- Parce/Ronshoot/ Pollard Residence- 1707 Hillside	Eligible	Eligible		Eligible individually or as component of an historic neighborhood district
	5BL6169- Pollard/Tisone Residence - 1709 Hillside	Eligible	Eligible		Eligible individually or as component of an historic neighborhood district
Boulder Creek 7	5BL358 - Switzerland Trail	Listed	Listed		
	5BL364 - Highland School			Listed	
	5BL606- Train at Central Park	Eligible	Eligible		
	5BL1729-Yocum Building	Eligible	Eligible		Possibly eligible as component of an historic neighborhood district

STREAM REACH	SITE NO./NAME	SIGNIFICANCE			COMMENTS
		NRHP	SRHP	LANDMARK	
	5BL5680-Bandshell at Central Park			Listed	
	5BL5820- Boulder & Left Hand Ditch	Eligible	Eligible		Unaltered portions
	5BL5990, 5991, 5992, 5993, 5994-Field buildings at Boulder High	Eligible	Eligible		Possibly eligible as component of an historic district
	5BL6015, 6016, 6017 - Eben Fine Park and Buildings	Eligible	Eligible		Possibly eligible as component of an historic district
	5BL6062 - Boulder Creek Bridge at Broadway	Eligible	Eligible		Possibly eligible as component of an historic district
	5BL6063-Central Park	Eligible	Eligible		Possibly eligible as component of an historic district
	5BL7094-Boyd Smelter			Listed	
	5BL8821-CCC Stonework	Eligible	Eligible		
	5BL8822- Sand Pits				

STREAM REACH	SITE NO./NAME	SIGNIFICANCE			COMMENTS
		NRHP	SRHP	LANDMARK	
Skunk Creek 2	5BL8819-Wellman Ditch	Eligible	Eligible		Unaltered portions
Skunk Creek 5	5BL3935-Anderson Ditch	Eligible	Eligible		Unaltered portions
	5BL5954- Green Mountain Cemetery	Eligible	Eligible		
	5BL8823- Concrete dam, diversion, pipe				
Bear Creek ½	5BL8819-Wellman Ditch	Eligible	Eligible		Unaltered portions
South Boulder Creek 2	5BL400-Colorado & Southern Railroad	Eligible	Eligible		
	5BL799 - Valmont Plant and Associated Features	Eligible	Eligible		
	5BL469- Union Pacific Railroad	Eligible	Eligible		
South Boulder Creek 3	5BL8819- Wellman Ditch	Eligible	Eligible		Unaltered portions

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APPENDIX IV-1

PARKS AND OPEN SPACE MANAGED LAND ALONG GREENWAYS

APPENDIX IV-1

List of Park Sites Along Greenways by Reach

Fourmile Canyon Creek
Foothills Community Park (FC 5)
19th & Violet (Boulder Valley Meadows) (FC4)
Elks Park Site (FC3)
East Palo Park (2 sites) (FC2)
Pleasant View Soccer Fields (FC1)

Wonderland Creek
Wonderland Lake Park (WC8)
Howard Heuston Park (WC3)
Christensen Park (WC2)
Valmont City Park (WC1, GC1)

Goose Creek
Parkside Park (ETC1)
Elmers Twomile Park (ETC1)
Mapleton Ballfield Complex (GC4)

Boulder Creek
Eben Fine Park (BC7)
Kids Fishing Pond (BC7)
Sculpture Park (BC7)
Municipal Complex & Library (BC7)
Central Park (BC7)
17th Street Pocket Park (BC6)
Scott Carpenter Park (BC5)

Skunk Creek
Arrowwood Park (SC3)

Bear Canyon Creek
Bear Creek Park (BCC6)
Martin Park (BCC4)
Park East Park (BCC2)

South Boulder Creek
East Boulder Community Center (SBC4)

Keewayden (SBC4)
Stazio Ballfield (SBC1, SBC2)
Flatirons Golf Course (SBC3)

List of Open Space Managed Properties along Greenways by Reach

Fourmile Canyon Creek
Mary Moore I & II (FC 5)
Palo Park Trail East (FC2)
Elgrove (FC1)
McKenzie (FC1)

Wonderland Creek
Anna Dunn (WC8)
Noble Park (WC2)
Plum Creek - North (WC2)

Boulder Creek
Fox (BC7)
Z-Folsom (BC5)
East Park #2 (BC3)
Sandy Arnold (BC3)
William Arnold (BC2)
Cottonwood Grove (BC2)
Pearl Street Industrial Park (BC2)
Colorado Open Land II-Sec 28 (BC2)
Colorado open Land II-Sec (BC1)
Union Pacific Railroad (BC1)
Colorado Open Land III-Sec 22 (BC1)

Skunk Creek
N.I.S.T. (SC5)

Bear Canyon Creek
Southern Hills United Church (BCC6)
Hatch-Quinby-Phipps (BCC1)

South Boulder Creek
Burke I (SBC4)

Gebhard (SBC4)
Burke II (SBC3)
Flatirons Industrial Park (SBC2)
Copper Door (SBC2)
Valmont industrial Park (SBC1)
Colorado Open Land III-Sec 27 KOA Lake (SBC1)

APPENDIX VII-1

LIST OF TRANSPORTATION CHANGES FROM THE MAY 1998 GREENWAYS MAP

APPENDIX VII-1

Transportation Changes from the May 1998 Greenways Map
Current Projects and Opportunities

Fourmile Canyon Creek
FC3

- **Added "reevaluate multiuse path from 19th St. to Garnet Lane and between Garnet Land and 26th St." in the text of the Reach Inventory**

The North Boulder Subcommunity Plan shows the path between 19th St. and Garnet Lane as a pedestrian only path with no off street path shown between Garnet Lane and 26th St. The Reach Inventory recommends that these areas be reevaluated for inclusion of a multiuse path as a separate process from the Greenways Master Plan update. These changes would require an amendment to the North Boulder Subcommunity Plan.

Wonderland Creek
WC3

- **Added underpasses at Iris and 34th St.**

Goose Creek
GC2

- **Added an underpass crossing Pearl Parkway east of Foothills Highway**

Elmers Twomile
ETC

- **Added an underpass at 26th St.**

Boulder Creek
BC2

- **Added a connection to 48th St.**

This connection is shown in the Transportation Master Plan.

Bear Canyon Creek
BCC1

- **Added an underpass at Arapahoe**

APPENDIX V-1

TRIBUTARY GREENWAYS GUIDELINES FOR OPEN SPACE AND PARK LANDS

APPENDIX VII-2

COST ESTIMATES FOR PROPOSED IMPROVEMENTS BY REACH

APPENDIX VII-3

DESCRIPTION OF ENVIRONMENTAL PROJECTS

APPENDIX VIII-1

MAINTENANCE MAP

APPENDIX VII-3

Greenways Environmental Projects
Top 10 List – Ranked by Project Scores

3/10/2001

Costs based on $60,000/acre for restoration
$30,000/acre for restoration/preservation
$1,000/acre for preservation
$50,000 per BMP

1. FC4 – Stream corridor enhancement and BMP at Violet Park
Preservation (#27): 186276 ft^2 or 4.28 acres
Restoration (#27): 186276 ft^2 or 4.28 acres
(4.28 P/R acres @ $30,000/acre)
Water Quality BMPs (#40) (@ $50,000 each)
Cost: $180,000

2. FC3 – Stream corridor enhancement 26th to 28th
Preservation (#31): 164693 ft^2 or 3.78 acres
Restoration (#31): 164693 ft^2 or 3.78 acres
(3.78 P/R acres @ $30,000/acre)
Cost: $115,000

3. BC7 – Improve water quality of kid's fishing pond, implement BMPs and revegetate banks through Eben Fine Park
Preservation (#24): 472549 ft^2 or 10.85 acres (@ $1,000 per acre)
Preservation (#23): 150973 ft^2 or 3.47 acres
Restoration (#23): 150973 ft^2 or 3.47 acres
(3.47 P/R acres @ $30,000/acre)
Water Quality BMPs (#47, 48, 64, 65) (@ $50,000 each)
Cost: $315,000

4. GC2 – Lower Goose Creek stream enhancement
Preservation (#40): 101576 ft^2 or 2.33 acres (@ $1,000 per acre)
Restoration (#41): 150405 ft^2 or 3.45 acres (@ $60,000 per acre)
Restoration (#42): 134314 ft^2 or 3.08 acres (@ $60,000 per acre)
Water Quality BMPs (#55, 56, 75) (@ $50,000 each)
Cost: $545,000

5. FC2 – Stream enhancement and sediment control downstream of 28th

Restoration (#43): 159542 ft^2 or 3.66 acres (@ $60,000 per acre)
Water Quality BMPs (#41, 42) (@ $50,000 each)
Cost: $320,000

6. **BCC5 – Water quality BMPs along Table Mesa drive**
   Water Quality BMPs (#9, 10, 11, 12, 13, 14) (@ $50,000 each)
   Cost: $300,000